Collaboration and co-management in Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site

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ABSTRACT

Natural resource management can be strengthened through the inclusion of both local knowledge and western science into the decision-making process. Co-management is a term used to describe an agreement between a local resource using group with some level of government which signifies the sharing of power and authority over natural resource management decisions for a given resource or ecosystem. The Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site, has been co-managed by the local Council of the Haida Nation and the Government of Canada since an agreement was signed by both parties in 1993. The Gwaii Haanas Agreement signifies that these two governing bodies with land entitlement disputes will manage this pristine area solely on consensus based decisions. Widely viewed as a successful co-management arrangement, those involved with the Gwaii Haanas Agreement today have recently publicly shared goals of improving collaboration among the partnering organizations. This research provides baseline data in regard to what the current collaborative relationships look like today, both within organizations and among partnering organizations. Our findings indicate that there are specific areas where increased collaborative relationships could potentially improve this co-management network. Further, my research shows that the community behind the Gwaii Hanaas Agreement plays a key role in the continued success of Gwaii Haanas co-management. The presence of strong, informal relationships outside of the professional co-management network strengthen the co-management network as a whole, demonstrating that community plays a larger role than politics when it comes to co-management success in Gwaii Haanas.

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Finally, my family and friends. Mom & Dad, Josh & King, and Angelina. You have all helped me through moments where I didn't think completing this thesis was possible. Celebrating this accomplishment is so much sweeter with you by my side. Thank you.

DEDICATION

Yah'guudang – our respect of all living things – celebrates the ways our lives and spirits are intertwined and honors the responsibility we hold to future generations. Yah'guudang is about respect and responsibility, about knowing our place in the web of life, and how the fate of our culture runs parallel with the fate of the ocean, sky and forest people.

Haida Land Use Vision, 2005.

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1 INTRODUCTION

Engaging multiple resource using groups and stakeholders in natural resource management is a long-standing topic in environmental research. Co-management, under its most common definition, describes a power sharing arrangement among resource using groups and governments for the purposes of sharing decision making and responsibilities in managing a resource (FAO, Fisheries and Aquacutlure Department, 2017). In general, co-management describes a governance arrangement that includes both local and governmental actors, and is a popular strategy for achieving sustainable and just environmental outcomes. Co-management replaces the typical 'top-down', or 'command and control' structure of environmental management and seeks to reform governance, that is, how decision-making power is distributed, to allow multiple groups with diverse knowledge to the decision-making table (Holling and Meffe 1996). While increasingly common, and widely discussed in academic literature on natural resource management, co-management has a relatively long history in the conservation sciences; the term, as traced back by Ostrom (2003), originated from the Boldt Decision which occurred during the 1970's in Washington state (The Boldt Decision, 1974). The Boldt Decision expanded fishing rights for treaty tribes in Washington to include not only harvest rights, which they previously had, but also the right to participate in decisions regarding planning and harvesting allocations (Pinkerton, 2003).

For at least two decades, co-management has been referred to in the academic literature as a best-practice for natural resource management, in part because it provides an opportunity to devolve power from its current concentration in high-level government agencies to a more equitably constructed co-management community (Jentoft, 2005; Tedesco, Segal, Calderon & Schiavetti, 2017). While many communities have experienced challenges introducing changes that dramatically re-make power structures, co-management has nevertheless been successfully introduced in many places. The research discussed here focuses on one such case: Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site (hereafter, 'Gwaii Haanas') in Haida Gwaii, British Columbia.

Co-management has been developed and pursued over the past 25 years in Gwaii Haanas. Here, my goal is to explore possible lessons from its apparent success. I look specifically at

social capital and social networks, which many argue are essential aspects of co-management (Berkes, 2009; Bodin et al., 2006; Pretty, 2003). One of my goals is to provide my research partners in the region with a tangible assessment of their co-management community, with specifics regarding the quality of individual professional relationships as well as the quality of organizational relationships at large. More broadly, I have a goal of generating knowledge regarding the successes and challenges of co-management in the region, to inform co-management theory and practice elsewhere.

1.1 Case study

Gwaii Haanas is located on the lower third of Haida Gwaii, British Colombia (Figure 1). It contains more than 1,800 islands with a unique history that spans over 12,000 years. Gwaii Haanas is home to a diverse range of wildlife, including over 20 species of whales and dolphins, and is largely made up of mountainous topography covered by the Pacific temperate rainforest. The space is also home to a UNESCO World Heritage Site where totem poles that are over 100 years old can be seen. These unique features are protected by Haida Gwaii Watchmen, who occupy the area during the tourist months to ensure Gwaii Haanas is treated with respect and that its visitors are able to enjoy the ultimate experience of the National Park Reserve, National Marine Conservation Area and Haida Heritage Site (Parks Canada, 2018).

In 1993, a co-management agreement was established for Gwaii Haanas via the Gwaii Haanas Agreement (The Gwaii Haanas Agreement, 1993), since then, the area has been co-managed by the Government of Canada and the Council of the Haida Nation. The Agreement signifies that both parties, the Government of Canada and the Council of the Haida Nation, agree to effectively and cooperatively[1] manage the designated Gwaii Haanas area, despite their disagreement regarding who has jurisdiction over the land. That is, no land claims settlement has been reached among the Government of Canada and the Council of the Haida Nation; regardless, both the Government of Canada and the Council of the Haida Nation (CHN) agree

[1] Co-management is a term widely used in academic literature to describe a resource management partnership. In the case of Gwaii Haanas, the participants of the agreement do not consider their partnership one of co-management, but rather a cooperative management agreement. For ease of translation, the Gwaii Haanas Agreement is often referred to as a "co-management" agreement here (refer to page 12).

that Gwaii Haanas is an important area to protect, and thus have successfully collaborated on management decisions for almost three decades (Hayes and Allen 2007). More recently, the Gwaii Haanas Marine Agreement was re-signed by the same organizations (Parks Canada and the CHN) as well as the Department of Fisheries and Oceans (DFO), in 2010, signifying their continued commitment to partnered work and collaboration. The decisions regarding Gwaii Haanas are made by the Archipelago Management Board (AMB), which today includes representatives from all three partnering organizations (DFO, Parks and CHN).

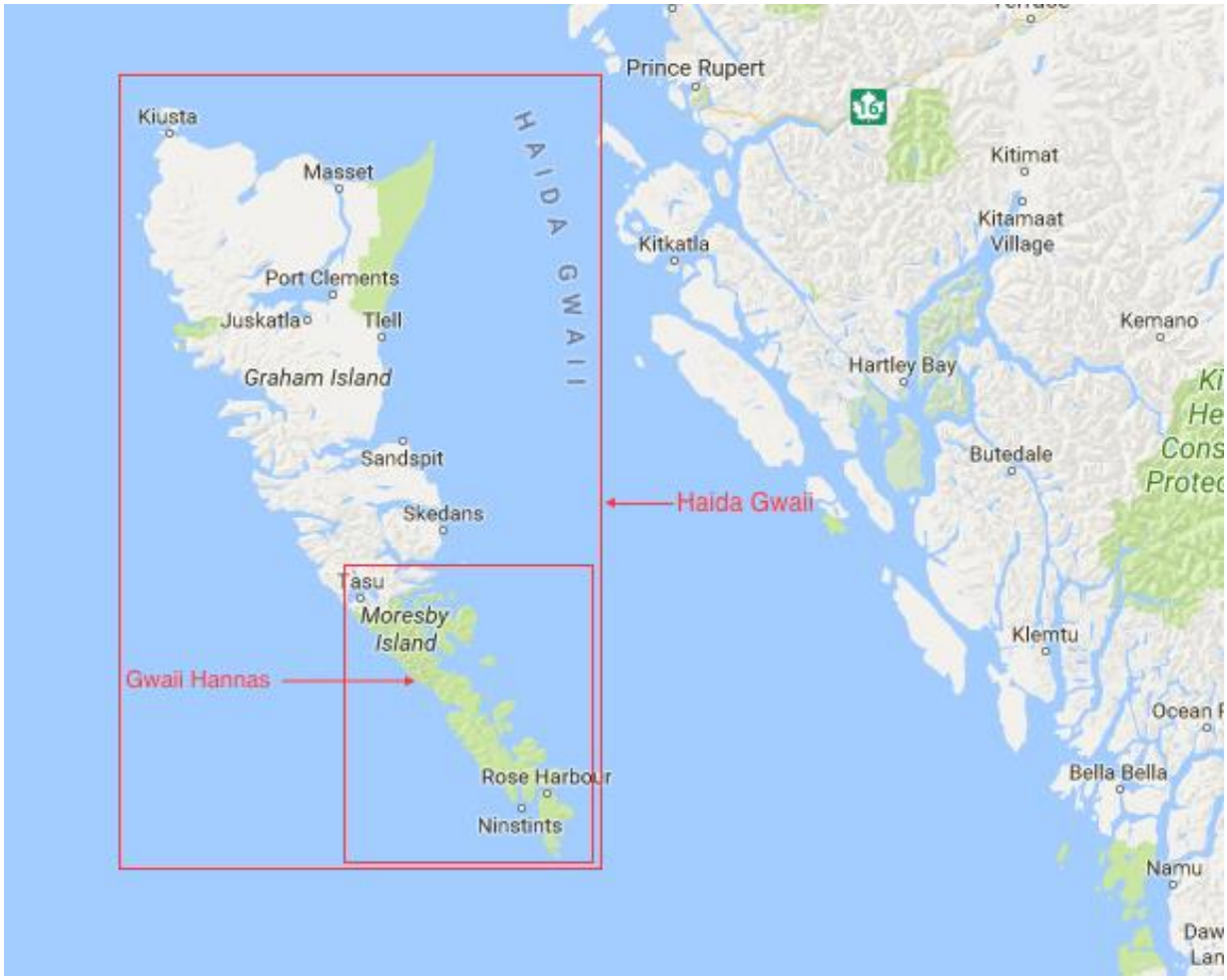

Figure 1: Map of Haida Gwaii and Gwaii Haanas (Google Maps, 2017)

The 2017 Land-Sea-People Management Plan is the most recent collaboratively authored document to be put forward by the AMB. Among the many objectives and targets set out in this plan, several speak specifically to strengthening collaboration efforts and

relationships between Parks, DFO, and CHN. The document is indicative of a desire among the three organizations to improve functional relationships within the current co-management community. My research was designed, in part, to help the AMB attend to their goal of improving collaboration as well as provide a baseline assessment of the social networks and collaboration within the Gwaii Haanas co-management community.

Gwaii Haanas is arguably a case where co-management has been working (Hayes and Allen 2007; Jones, Rigg, & Lee, 2015), at least as indicated by the various groups' buy-in and willingness to remain engaged in the arrangement[2]. As such, and following Ebbinghaus (2005), I propose that this is a case worth investigating for the identification of best-practices for achieving buy-in and effective co-management elsewhere.

1.2 Approach

Elinor Ostrom (1990; 1992) wrote extensively on the importance of natural resource management institutions enabling people to function as a community; in addition to suggesting several principles for the management of common pool resources, she also argued that effective management requires long-term interaction, development of shared values, and ability to communicate directly with one another (Ostrom, 1992). That is, not only must people agree on a set of rules and roles, but they must also develop a sense of community. Following Ostrom's idea on sense of community, my working assumption is that effective co-management of resources relies, in part, on the development of a healthful community of practice among those involved in the co-management agreement. Wenger (1990) defines a community of practice as "a kind of community created over time by the sustained pursuit of a shared enterprise" (p. 45). I contend that the concept of community of practice (CoP) captures the shared values and high-quality communication for which Ostrom advocated, as well as other best-practices that have been suggested for natural resource management, such as transparency, trust, and shared goals (Armitage et al., 2009). My methods below draw on two areas of theory to explore this co-management community: community well-being, using a framework offered by Wilkinson (1991), and social capital theory as presented primarily by

[2] This research is not intended to evaluate the environmental outcomes of co-management.

Granovetter (1973) and Burt (2004). My research methods involve an analysis of the policies and mandates in place for the co-management of Gwaii Haanas, as well as a social network analysis (SNA) to examine the current structure of social relationships and social capital present in the CoP.

For the policy analysis, I apply Wilkinson's community well-being framework, which suggests five conditions for community well-being (expanded on in section 2.2), to the Gwaii Haanas' management mandate as set out in the 1993 Gwaii Haanas Agreement. The second portion of this research assesses the structure of the social network within this co-management community. People at all three organizations who participate in Gwaii Haanas management, CHN, DFO, and Parks, were asked to identify whom they consider to be important to effectively complete their professional tasks, both from within and outside of their organization.

The thesis that follows is organized into four chapters. The next chapter is a review of the relevant literature on co-management, community, and social capital. This chapter also provides a brief introduction to the case study area. Chapter 3 describes the methods employed to conduct this research and the analysis of the results. Chapter 4 presents the results, followed by Chapter 5, which discusses the results and the storyline they convey. Chapter 6 provides a summary of the overarching lessons found through this research and how it can contribute to the current state of environment and sustainability practices as well some suggestions of future work that could be done to support the findings from this research.

2 LITERATURE REVIEW

The term 'natural resource-dependent communities' is widely used to describe places that rely on a specific resource or set of resources for their well-being (Stedman, Parkins & Beckley, 2004). These resources and resource harvesting activities often have cultural significance, which ties the community to the land or sea. These cultural ties make it difficult for government entities to implement a management regime that is well suited for a specific resource as well as accepted by the public or local citizens (Loring and Harrison 2013; Loring et al., 2014; Bennett et al. 2016). However, it is becoming more common for government resource managers to seek out and include public voices and values in resource management decisions, given the fact that the public is often most directly affected by management decisions. In fact, some argue that when the public is granted some power over how their environment is managed, both the well-being of the community and the effectiveness of natural resource management is enhanced (Jentoft, 2005, Fazey et al., 2007; Cinner & Huchery, 2013; Oldekop, Holmes, Harris & Evans, 2015). More so, the involvement of the public in natural resource management is more likely to yield cooperation in the long-term as the people who helped contribute to a management decision are likely to maintain these actions over time (Pretty & Ward, 2001; Dirhamsyah, 2013). The remainder of this chapter will review literature that expands upon these concepts, beginning with an overview of co-management literature, then moving into community well-being, community of practice and social capital literature. This chapter concludes with an introduction to the history of the study area, Gwaii Haanas, and ends by discussing the state that it is in today.

2.1 Co-management

Co-management describes a range of strategies for deliberately empowering resource users in resource governance. Alternative resource management structures, such as co-management, are often pursued when existing institutions are deemed unsatisfactory, whether because people are unhappy with the process or outcomes, or because local people are looking to assert sovereignty over local resources and ecosystems (Tedesco et al., 2017; Diver, 2016; Chuenpagdee & Jentoft, 2007). Likewise, events such as crises and reorganization allow for a

window of opportunity to facilitate change in how resources are managed (Folk, Hahn, Olsson & Norberg, 2005). Co-management has also opened the door for the political empowerment of Indigenous governments in Canada, ultimately allowing communities that were previously powerless over government natural resource practices to regain influence in the decisions behind resource management for their community (Natcher, 2001). While many local groups aspire to attain such an arrangement, some examples of attempts at co-management have illustrated that it can be difficult to develop institutions for shared governance that fully address the deep-rooted issues of disempowerment and inequity that are at stake (Nadasdy, 2003; Takeda & Ropke, 2010). Many of these difficulties and challenges are documented in co-management literature, where I observed that an overarching focus exists on the discussion of the tumultuous relationships and an unwillingness on the part of existing governments to fully devolve institutions and breakthrough to an authentic, new form of shared governance (Sandstrom, Crona & Bodin, 2013; Natcher et al., 2005; Carlsson & Berkes, 2004). Nonetheless, it is important to acknowledge that incorporating local knowledge, values, and priorities, to any extent, into natural resource management is perhaps the only way to achieve equitable and just outcomes. Traditional local knowledge can work alongside typical western science approaches to improve management initiatives (Polfus, Heinemeyer & Hebblewhite, 2013), and returning to previous ways of state run politics is simply not seen by many as a politically-viable option (White, 2008). Co-management is a viable way to develop a structure that is capable of effective and equitable decision making and policy development (Armitage, 2005; Berkes, 2009).

The idea that the provincial, federal, and indigenous governmental groups are able to cooperate on decisions regarding environmental management in Canada is significant. Canada's Indigenous population and Parks Canada have had a challenging relationship since the first National Park was created in Canada, Banff National Park, in 1883 where the Indigenous population were removed from their traditional land, which was slated to become a National Park, without much consideration (Thomlinson & Crouch, 2012). The federal government and Indigenous perspectives regarding how people "use" the land have not always aligned. While the government uses the land as means to generate economic and social benefits to our country (i.e Haida Nation v. British Colombia Minister of Forests, 2004), many of

Canada's Indigenous people feel spiritually connected to the land in a way that has enabled them to live off of the land for generations (Turner, Ignace & Ignace, 2000).

With this in mind, the establishment of co-management as a management practice in Canada could represent a big step toward reconciling the relationship between Canada's Indigenous population and the government (The Truth and Reconciliation Commission of Canada, 2015). Since 1975 when the James Bay and Northern Quebec Agreement was created (see Berkes, 1989), co-management has been trialed in many locations across the country. The amount of authority returned to the community from the government via a co-management agreement is arguably one of the most significant variations in how co-management has been or might be implemented. Berkes (2004) argues that a common reason resource management is unsuccessful is due to the resource being managed at the wrong level of government, where not enough power has been given to the entity that can most effectively manage the resource. Perhaps there is not enough reason or thought behind the default level at which a given resource is managed, be it local, provincial or federal. Natural resources and their systems are inherently complex and therefore systems may be better off employing participatory approach geared towards local empowerment as opposed to an expert based approach, which utilizes government skills, to effectively manage resources (Berkes, 2004).

The effective management of natural resources is certainly not the only pillar that is evaluated in the outcome of co-management. In fact, the definition of "successful" or "unsuccessful" co-management remains difficult to pin down. Yet, there are a variety of valuable studies that assess the reasons for success and failure in co-management, and one of the commonly identified challenges involves underlying cultural differences (Armitage et al., 2011; Watson, 2012; Stevenson, 2006; Natcher et al., 2005). That is, ineffective natural resource management can affect a local community's livelihood and well-being, and regardless of generations of traditional knowledge and information, the responsibility for resource management almost always falls under the responsibility of the State, whom typically employs economic based approaches to environmental management (Mackino, 1993). Not surprisingly, the differing perspectives on natural resource management between Canada's Indigenous people and the Government of Canada are not always understood by both sides (Usher, 2000). However, co-management agreements do not guarantee that these different perspectives change. Stevenson (2006), for example, contends that the fundamentals of co-management do

not provide the grounds for meaningful participation to be successful to begin with. He supports this argument by drawing attention to the idea that the structure and logistics of co-management are often tailored to the academic and government way of doing things, and that alternative arrangements to co-management would hold more potential for success.

Natcher et al., (2005) theorizes that these fundamental areas of contention are critical for the problem-solving process in co-management. In his work, he discusses how First Nations typically have a collectivist culture, where the welfare of the collective society is more important than individual interests and the well-being of future generations is valued. Alternatively, individuals identified as non-First Nation have individualistic characteristics in that they prioritize short-term goals in pursuit of their own successes. When stakeholders bring these different perspectives to the decision-making table, it creates an opportunity for people, if they are willing, to think more creatively in order to come up with a logical solution to the problem. While in theory this arrangement sounds appealing, in practice, the ability to solve conflicts collectively as a group can be limited or the opinions of those with less political power are overlooked in the outcome (White, 2006). In fact, the structure of the decision-making process in which a given co-management agreement must adhere to can limit the extent in which a stakeholder opinion is considered. That is, if a co-management agreement does not embody the equal empowerment of all groups involved, then the outcome of the decisions will reflect the values of the group holding this most power. This sort of structure resembles an 'instructive' type of co-management (Sen & Nielsen, 1996). When a co-management agreement embraces equality, then the views of each group are incorporated into each decision, ultimately merging stakeholder values opinions as an outcome. Sen & Nielsen (1996) refer to this type of structure as 'cooperative' co-management (see page 11). In the case of the Gwaii Haanas Agreement, groups involved are to make decisions solely based on consensus. This obligation can minimize hierarchy or uneven dispersal of power in co-management decisions, empowering, and possibly encouraging, differing perspectives at the decision-making table. Collaborative approaches which integrate both local knowledge and government information can lead to better informed conservational policies and decision-making (Polfus et al., 2013)

Natcher et al., (2005) explored a case in the Yukon Territory where co-management was implemented as a result of the Yukon Umbrella Final Agreement (1993). The study

introduces the idea that cultural differences have the potential to lead to more advanced management decisions, given that it opens up the opportunity for decisions to be made based on information from a larger knowledge pool. The management group in the Yukon suggested, however, that underlying cultural differences can also impede people's ability to achieve effective co-management. Paul Nadasdy's work (2003), though arguably not based on an actual case of co-management (Stevenson, 2008), brought attention to a similar concern, that co-management might not be sufficient to correct existing power imbalances among communities and the state. In fact, Nadasdy suggests that co-management can be used as a veil for the continued colonial subjugation of First Nations. However, his critique has itself been critiqued, given that the case was not in fact an example of co-management, and that local people involved felt that his writing was disingenuous and not fairly representative of the hard work being done by local people to create new forms of collaborative governance (Stevenson, 2008; Clark, D., personal communication, 2017). These examples illustrate the challenges that co-management agreements can often encounter.

It is also important to note that some of the literature takes a notably negative tone, which can be misunderstood as implying that co-management most commonly fails when it is practiced. However, there have been many cases where effective management outcomes have been achieved through co-management arrangements (e.g., Stevenson, 2006; Castro & Nielsen, 2001; Finkbeiner & Basurto, 2015).

Clark & Strack (2017) contend that there are two primary threats challenging co-management today: one is the fluctuation in which government seems to accept and resist the adoption of co-management, and the second is academia and its critical stance towards co-management, which can discourage those seeking co-management as a method of empowerment. The latter has been, and will continue to be discussed in this thesis. The former, however, is a concept that governments continues to face in pursuit of finding the most effective way to manage natural resources. The debate regarding who the real "winners" and "losers" of co-management are, or who benefits the most from such an arrangement, is constantly evolving as emerging perspectives continue to surface in the political world (Adger, Brown & Tompkins, 2006; Diver, 2016), affecting how/if co-management is pursued as an option.

That being said, the benefits of effective co-management are important to explore. Commonly, those involved in the co-management agreement (the CoP) and the local community experience the benefits co-management can materialize. In a case explored by Donda (2017), it was found that the government of communities surrounding Lake Chiuta in Malawi received benefits from fisheries co-management, such as reduced management costs and credit for sustainable fisheries management, while the community saw "increased household incomes and improved livelihoods" (Donda, 2017). The community involved, however, must have the ability to meaningfully participate in co-management (Dirhamsyah, 2013). Without this, there is a heightened potential for the arrangement to deteriorate, leaving the community with a management structure similar to pre-existing conditions (likely where government higher-ups are given the only voice in the decision-making process) (White, 2006). Co-management may be most successful when it is based upon a "knowledge partnership" as opposed to a newly configured power relationship (Berkes, 2009). The role of government in a co-management partnership, as argued by Pomeroy and Berkes (1997), is to provide legitimization and accountability as well as define, and potentially rewrite, legislation to commit to the decentralization of its own power.

Sen and Nielsen (1996) categorize different levels of co-management relationships. According to their spectrum, there are five different categories of co-management arrangements, reflecting the respective roles of government and community (Figure 2). The spectrum ranges from an **instructive** relationship, where there is minimal exchange of information between the government and community, to what they classify as an **informative** relationship, where the government has given the community complete authority over decision-making. They have defined the three phases falling between these pillars as: **consultative**, where mechanisms exist for government to consult with the community, but all decisions are taken by government; **cooperative**, where government and community cooperate as equal partners in decision-making (often where the definition of co-management falls) and finally; an **advisory** relationship, where the community advises the government of the decision to be taken and government endorses these decisions.

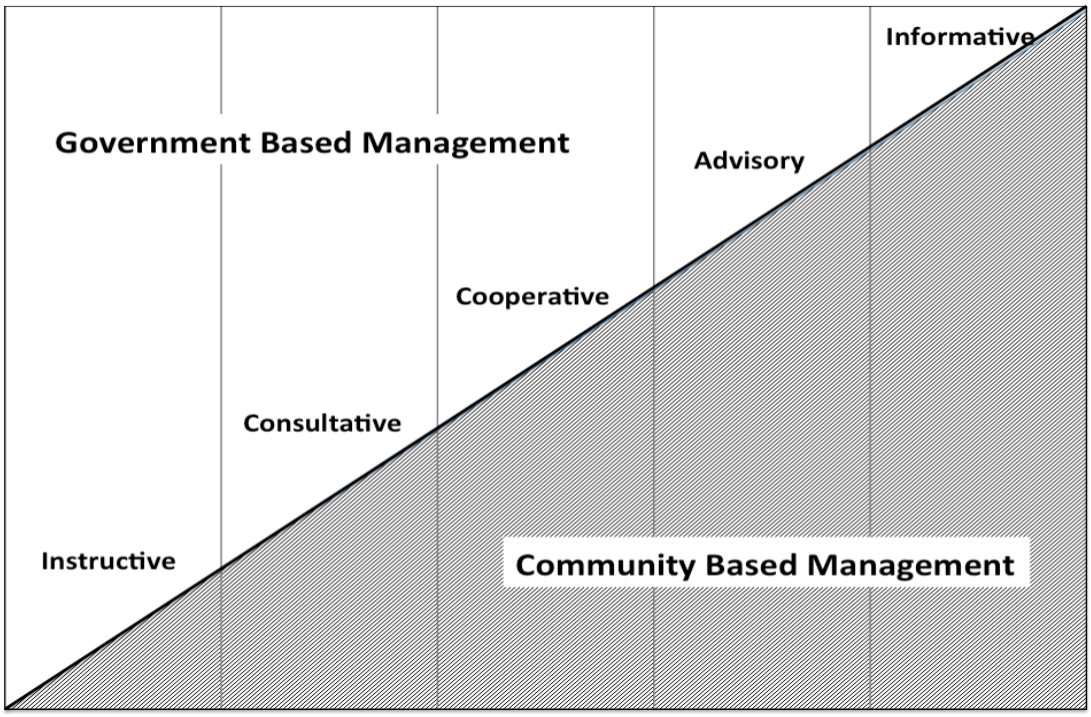

Figure 2: Co-management spectrum. Spectrum of co-management arrangements that demonstrates different levels of power designated to the community from the Government (concept adopted from Sen and Nielsen, 1996).

In terms of government-community relationships, it is important to understand where on the spectrum most interactions take place within a co-management relationship. Jentoft (2005) argues that co-management does not actually exist in the absence of local empowerment. For example, an arrangement may be thought of by some as "co-management", while the actual arrangement is still best described as instructive or informative; such cases would be co-management in name only, where either the government or, more rarely, the community, continues to enjoy a political advantage over the other party.

It is important to note that there can be sensitivities surrounding what terminology is used to describe a specific co-management agreement. These sensitivities, which are often rooted in government agencies, do not change the fact that co-management is, indeed, being practiced. Co-management, as used here, is an all-encompassing term used to describe power-sharing between groups (Clark & Joe-Strack, 2017). Nonetheless, different terminology has emerged to describe slightly differing power arrangements. In the case of Gwaii Haanas, Parks Canada describes the agreement as a "cooperative management agreement", in which they define as "a management model where Aboriginal groups work collaboratively with Parks

Canada on the management of the Agency's protected places" (Parks Canada, Aboriginal Affairs Secretariat Bulletin, 2013). According to the bulletin offered by Parks Canada, cooperative management differs from co-management in that 'true' co-management sees authority equally distributed among the parties in the agreement. In Canada, federal legislation does not grant the Minister permission to give up his or her authority in any situation, making a "real" co-management agreement unattainable. Parks Canada characterizes cooperative management as more of an advisory relationship, where an advising body (in this case the AMB) is created as a result of an agreement. In the case of Gwaii Haanas, all parties have agreed to act only by consensus, so that no party technically has to relinquish their claim to full (and sole) authority.

A variety of additional practical challenges to co-management have also been identified by researchers. Correctly identifying those involved or who should be involved in the process (Carlsson & Berkes, 2004), determining the scale of which a given resource should be managed at (Berkes, 2004), a dominant focus on resource management as opposed to relationship management (Stevenson, 2006), the failure to recognize the resources value in a local context, ie. fishing as a way of life as opposed to a resource (Coulthard, Johnson & McGregor, 2011) and the extent to which local resource users are politically empowered (Sen & Nielsen, 1996) are all common issues that deter co-management from attaining success. For co-management to achieve success, by any standards, it must seek to recreate the existing political context (Armitage et al., 2009). Success, therefore, begins with the acknowledgement of these divergent cultural views and biases, and a proactive attempt to nonetheless foster realized relationships and a sense of community among these diverse co-management participants.

Many scholars suggest that the relationships among those engaged in co-management is the most vital feature of whether the arrangement will be successful (Natcher et al., 2005; Ostrom, 1992; Pinkerton, 1989). That is, a level of personal engagement and trust must exist before a shared authority can be realized, and it ultimately depends on the commitment and engagement of those involved to make the arrangement work effectively. The emphasis placed on personal engagement and strong relationships in co-management is seen most in social capital literature, which suggests that trusting relationships among stakeholders are imperative in order to produce gains in a society (Szreter and Woolcock, 2004) and minimize conflict

between user groups (Lauber, et al., 2008) as well as the potential to connect groups that would have remained disconnected. Ultimately, when co-management is effectively integrated into a management system, it will build a community regardless of the circumstances (Jentoft, 2005).

2.2 The importance of community to co-management

Ostrom (1992), speaking generally about natural resource management, argues that a sense of community is essential for managing resources successfully. That is, effective governance requires that all parties involved foster long-term interactions, and development of shared values and institutions for collective action, including ability to communicate directly with one another. She argues that the effective management of resources requires not just establishing agreed upon rules and roles for the people involved, but also that a sense of community and shared interest emerge as well. This general proposition has been discussed extensively in the co-management literature. Pinkerton (1989), for example, argues that it is the level of personal engagement and trust that ultimately make the benefits of co-management materialize. Berkes (2009) refers to co-management as a "knowledge partnership". Natcher et al. (2005) argue that co-management is as much about managing social relationships as it is about managing resources. Similarly, Jentoft (2005) and Armitage et al. (2008) argue that strong, trusting relationships between the agencies involved is essential to co-management. These authors are conceptually discussing that co-management must function as a community of practice, and that this community must be healthy and "well" if the co-management is to be successful.

One of the objectives of this research is to identify and characterize the relationships that presently exist among the co-management community in Gwaii Haanas. This objective requires not only an assessment of the quality of personal relationships within the partner organizations but also an assessment of the overall quality among the organizations themselves.

Building on the above arguments, I propose that effective co-management requires that the individuals involved succeed in developing a *Community of Practice.* Communities of practice are formed over time as informal social groups that have a common interest to pursue

similar goals and aspirations (Wenger, 1999). In a co-management network, the community of practice not only involves the core decision makers but also those whose work feeds into the practices and effects the decisions that are made. Additionally, be it good or bad, this community has many social dimensions that contribute primarily to the social well-being of those in the network. Essentially, when a community of practice is functioning well, it has positive implications for the well-being of those involved.

Community of Practice Theory suggests that humans experience most of their learning through informal social interactions (Wenger, 1999). Through time, we develop interests and hobbies that result in informal social groups, which Wenger terms 'communities of practice'. Communities of practice can vary in size, area of focus and membership attainment, meaning that some communities of practice are easily accessible and others are not. Communities that can make progress or grow are typically those where "outsiders" are welcome to participate (Lauber, B., et al. 2008). In this way, new ideas are more likely to be introduced to the community of practice due to the barriers to entry being more translucent, allowing for peripheral participation. On the other hand, when the community of practice has structured barriers to entry, the communities' growth is more likely to remain static via the absence of outsider ideas and information (Schusler, Decker & Pfeffer, 2002).

Related literature discusses the importance of a pre-established community of practice or local institution in co-management, suggesting that such an arrangement is more likely to succeed when there has been a group of individuals that have shown interest and dedication to conservation of the resource of concern prior to entering co-management (Pomeroy & Berkes, 1997). It can take years for a localized institution to build authentic trust and relationships within the community, however, and when this is established, the community can experience local empowerment as a result of the positive guidance provided by the institution. Wallerstein (1992) defines community empowerment as the "social action process that promotes participation of people, organizations, and communities towards the goals of increased individual and community control, political efficacy, improved quality of community life and social justice". Additionally, Pomeroy and Viswanathan (2003) argue that co-management is more inclined to succeed when the community is "empowered and organized". It can be argued, then, that a pre-established local institution built on the community's trust and

empowerment is a critical component in the outcome of co-management.

Wilkinson (1991) further explores the linkages between a community, the environment and the social well-being characteristics that contribute to a functional community of practice. His framework is based upon the premise that individual well-being, social well-being and ecological well-being are part of the same concept, however, each is a categorized as a different level within the concept. These levels ultimately compliment and rely upon one another (Wilkinson, 1991), with each level involving a larger environment as they progress, beginning with individual well-being which is primarily made up of personal or private experiences, then social well-being, which is derived from one's social environment and their interaction with the community, and ecological well-being, which is the natural processes and the sustenance provided from one's environment. The framework selected in this research is premised on exploring and expanding social well-being and its relationship with community well-being.

Conventional definitions of community well-being are often based upon characteristics like household income, employment rates, level of attained education and housing conditions (Indigenous and Northern Affairs Canada, 2010); however, these indicators are not generally applicable to a community of practice. Therefore, the community well-being definition, as used here, is directed more towards social interactions and the level of bonding that arises with those interactions, where "the substance of community is social interaction" (Wilkinson, 1991, p. 13). How the community interacts, therefore, directly influences the level of social well-being in the community, reinforcing the prioritization of healthy relationships. Wilkinson's framework on social well-being is a useful tool in helping assess the quality of social interactions in a community. He theorizes that five criteria make up the dimensions of social well-being which can ultimately be used to explore community well-being.

1. Distributive justice. Distributive justice is often met when there is a respect of equality among the community, or an understanding that all "people are equally human" (1991, p. 73). Distributive justice refers to actions among the community that are taken to purposely remove inequalities amongst one another and a clear direction towards a system with equal access to goods and services. Communities with

distributive justice as a quality are likely to experience effective communication among one another as well as the facilitation of accurate and affirmative interpersonal responses.

2. Open communication. This condition focuses on the efficiency and effectiveness of the channels of communication available in the community. When open communication is present, it implies that a communities' network is open to facilitate honest, authentic interactions premised upon respect for oneself and for others. Communication is arguably the most important component of human interaction and social well-being as it is a critical instrument in the formation and maintenance of social relationships. Wilkinson argues that social well-being is obstructed if or when the flows of communication are tampered with.

3. Tolerance. The third condition is based on collectively accepting both the differences and similarities of individuals amongst the community. This can be in regard to religion, race, age, gender, occupation, working class, among other visible and inconspicuous individual characteristics. When tolerance is present, there is a shared standard of behaviour amongst your peers, promoting overall well-being in the community.

4. Collective action. Collective action is premised upon the idea that people must work together collectively in pursuit of their community's common interests or goals. These interactions facilitate sense of community and promote relationship growth among the individuals working together. Wilkinson argues that the process of collective action is the foundation of all communities at the local level and depending upon the extent to which it occurs, collective action enriches the lives of the shared population.

5. Communion. This fifth and final condition is arguably the conclusion to social well-being, in that when communion is present, equity, openness, tolerance and collective action are encouraged as well (1991). Communion refers to the consciousness of a community and the extent to which realized relationships are celebrated and enjoyed as opposed to demanded or expected through ideologies. Communion provides a sense of emotional life in the communities existing relationships and celebrates intentional entry into these relationships. Communion and community development signify similar traits

and characteristics, allowing positive growth to occur in social well-being through individual relationships.

By using this framework as a guide to community well-being, this research will explore the linkages between social interactions and the well-being in the co-management community of practice.

Finally, a premise of my work is that co-management is much more than just the merging or restructuring of two agencies. It is as much, or more, about the people, and perhaps more specifically, the capacity of the people or community of practice involved. Berkes (2001) argues that capacity building is integral to co-management, with the UNDP defining capacity building as "the sum of efforts needed to nurture, enhance and utilize the skills and capabilities of people and institutions at all levels". When communities or institutions mindfully prioritize capacity building while recognizing individual strengths, the network amongst the community prospers (Berkes, 2009). Thus, community empowerment is often a by-product of accessing the social capital that contributes to the community's well-being.

2.3 Social capital

The term "social capital" has gained the attention of many scholars over the years. Pierre Bourdieu's social capital theory work in the 1980's defined social capital as "the aggregate of the actual or potential resources which are (…) linked to membership in a group" (Bourdieu, 1986). Bourdieu made many fundamental contributions to the social capital literature, most relevant here, however, is his suggestion that social capital is perpetuated through group members investing in relationships, making it very much a group asset. Similarly, Robert Putnam, another noteworthy scholar in the social capital literature, highlights that society functions at an optimum when individuals cooperate with one another. We are inhibited in our ability to always cooperate due to expectations of others not being fulfilled in return for our participation (Putnam, 1993). Lin (2002) describes social capital as the investment in relationships with expected returns. More generally, it can be understood as the social and human resources that people have access to that make collective action possible.

In natural resource management, the idea of social capital often becomes prominent during the decision-making process, specifically in a co-management arrangement. Typically, one group involved in the management decision will have access to more individuals with the necessary tools and knowledge (ie. social capital) than another group, ultimately giving one group an advantage over the other in advancing political agendas. The tangible and intangible gains that can stem from social capital come in the form of knowledge, ideas and resources. In resource management, Lauber et al. (2008) argue that there are clear reasons that suggest why one group would choose to interact with another group in community based management: 1) to exchange ideas; 2) disseminate knowledge; 3) provide funds; 4) provide other tangible resources; and 5) exert influence. These interactions are largely based on establishing bridging capital, where something is being transferred to or from a subgroup outside of one's own, with an expectation of some sort of return on investment. However, the returns on investment vary depending upon the strength of the relationship at hand.

Social network theory posits social ties as an important aspect of social capital (Granovetter, 1973). Social networks are likewise known to be important to the effectiveness of co-management (Bodin and Crona 2009) and below is a discussion of what is currently known about the importance of social ties, their strength, structure, and function, as it relates to co-management.

The strength of a relationship or social tie is dependent upon a combination of four things: 1) the amount of time put into the relationship 2) the emotional intensity of the relationship 3) the intimacy of the relationship and 4) the amount of reciprocity that characterizes the tie (Granovetter, 1973). The strength of a connection is typically classified as "weak" or "strong", however, the way in which these connections develop or the underlying characteristics of these connections can be classified further into three different categories: bonding, bridging or linking ties (Szreter & Woolcock, 2004).

Bonding ties are the strongest form of social tie and are typically developed among family members, close friends and between people with similar characteristics such as age, ethnicity, education, occupational/hierarchical position, and wealth (Bodin and Crona, 2009). These ties are horizontal in nature and occur between members of a network who view themselves as having similar or shared social identities. Bonding ties are formed easily amongst those who already know one another and therefore do not promote new experiences

or creative thinking as the patterns of thought and social norms are usually too similar to spark innovation. However, the value of a bonding tie is unparalleled as these strong ties are considered to be the building blocks for broader social networking (Sabatini, 2009).

Bridging ties are characterized as those relations that connect individuals or groups with dissimilar traits such as gender, ethnicity, age or any other varying attributes belonging to individuals or groups (Bodin and Crona, 2009). They exist among those who are aware that their socio-demographics are different, however, a sense of respect and mutuality remain (Szreter and Woolcock, 2004). Bridging ties often occur among weaker ties, where a connection forms between people that would typically remain segregated via societal constructs. These ties are more difficult to obtain and sustain than bonding ties, as dissimilarities are at the forefront. However, if and when these ties are able to develop, the benefits are exceptional. These ties can offer exchanges of foreign information and new knowledge between different actors or groups. Bridging relationships have the capacity to foster new growth and ideas while potentially resulting in a trusting relationship among players from disconnected groups (Bodin and Crona, 2009).

The third tie commonly identified among social capital literature is a linking tie. A linking tie, again occurs from weak ties, refers to ties that are formed by people interacting across explicit, formal, or institutionalized power or authority gradients in society (Szreter and Woolcock, 2004). Linking ties are beneficial in developing bonds that extend beyond groups or individuals of the same level to those with advanced political or financial power. These connections ultimately allow group members to 'scale-up' towards higher levels of social capital and political efficacy (Sabatini, 2009).

As discussed, bonding ties are typically the strongest form of tie. This is because bonding ties are premised upon similarities among the individuals involved, therefore the connection arrives somewhat effortlessly. In any case, strong ties involve a large time commitment. The more frequently people interact, the stronger their tie becomes Therefore, it can be inferred that tie strength can be based upon how often individuals interact with one another (Granovetter, 1973). Granovetter (1973) divided frequency of contact into three categories: often, occasionally and rarely. 'Often' is defined as the parties interacting at least twice per week. 'Occasionally' is when people interact with one another more than once a year

but less than twice per week, and 'rarely' is when the frequency of contact occurs once per year or less.

While strong interpersonal ties can be desirable or an asset, Granovetter (1973) suggests that more people can be reached through weak ties. Weak ties expand out further in a network and are more likely to link members of different groups than strong ties. Further, more novel information is shared through weak ties as they hold more unfamiliar information than links between strong ties. Weak ties play a critical role in networking and 'scaling up' and can often be integral in building social capital (Granovetter, 2005).

On a similar note, Burt (2004) suggests that a primary source of progress within a network stems from those individuals whom are regularly exposed to people from different subgroups. As opposed to the quality of the tie, Burt focuses more on the way different networks are bridged. He suggests that people who have ties in different networks are at an advantage from their structural position. As opposed to only being involved with those in the same subgroup who share homogenous opinions and ideas, people who operate spanning between groups become more familiar to alternative ways of thinking and behaving. Burt (2004) terms these information gaps between social networks 'structural holes'. Exposure to these holes provides people with more options or tools to choose from in the process of problem solving or decision-making, making them more inclined to produce good ideas. Both the community well-being component and the concepts from social capital literature will contribute to the relational assessment of the Gwaii Haanas Network.

2.4 Study area

2.4.1 The history of Gwaii Haanas

This research is situated on Haida Gwaii, an archipelago located approximately 100 kilometers off the west coast of British Colombia, Canada (Figure 1). The closest community on the mainland is Prince Rupert. Of the 5,000 residents living on the island, approximately half of them are indigenous Haida (Council of the Haida Nation, 2013). The lower third of the archipelago is the Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site, often referred to as "Gwaii Haanas" from here on out.

The Haida have, since colonial times anyway, lacked full authority over the natural resources they have shared cultural relationships with for generations. In the 1970's the Haida watched as the Federal Government failed to effectively manage several marine species in the region (Pinkerton, 1989), some of which, such as the herring stock, still struggle to re-establish themselves today. Similarly, the Haida have struggled to prevent logging companies from depleting valuable tree species from the archipelago while the Government failed to consult the Haida about logging activities that were occurring on their land (see *Haida Nation v. BC*, 2004). Co-management in Haida Gwaii essentially arrived as a by-product of these early resource controversies, as locals voiced their desire to reach an agreement with the Government allowing them to develop resource management that did not require finances or other resources from the Federal Government. The Haida people felt that due to their relationship with resources, it would not be possible for management based on a different set of values to effectively guide the future of resource management on Haida Gwaii (Pinkerton, 1989). In 1993, the Gwaii Haanas Agreement was put into place and has remained a primary guiding document for Gwaii Haanas to this day.

Despite several legal encounters with the Provincial and Federal Governments regarding Haida Gwaii's natural resources, a co-management agreement was, and still is, seen by some as the best way to move forward for both the Government and the Council of the Haida Nation (CHN) (Jones, et al., 2016). While co-management has without a doubt been helpful, it is not the silver bullet to end controversies that continue to take place over differing knowledge bases and perspectives. As recently as 2015, the CHN and Department of Fisheries and Oceans have found their environmental management perspectives to be at odds with one another, eventually turning into a case that involved in the Supreme Court (see *Haida Nation v Canada*). In this case, the Haida contended that the herring, a fish species with cultural and traditional value, were not at a sustainable stock level to re-open the fishery that had been closed since 2003. The herring fishery was re-opened in 2014 without consulting the Haida, however, the Supreme Court of Canada determined that without a doubt the herring fishery should have never been re-opened and ruled to close it once again in 2015 (Haida Nation v. Canada). Shortly after this outcome was announced, the Federal Government revoked their participation in the Haida Marine Planning initiative, ultimately bringing tension to the co-management table.

Throughout these experiences and looking towards the future, the CHN has been, and continues to be, an extremely valuable asset to the Haida. The council, which was established in 1974, has been discussed by many as the driving force behind the success of Gwaii Haanas, fueled by the trust and engagement of the Haida (Jones, et al., 2010; Takeda and Ropke, 2010). Ernie Gladstone, the superintendent of Gwaii Haanas, summarized the co-management arrangement well, as quoted in Hayes and Allen (2007):

> *If I have to give one reason why Gwaii Haanas is protected and why the Gwaii Haanas Agreement works, it's because the individuals at the Management Board table, from both the Council of the Haida Nation and Canada want this to work; and the reason we want it to work is not because we feel we have a legal duty to make it work. We want it to work, because we think it is the right thing to do.*

While this agreement is working, at least from the perspective of all parties' sustained willingness to engage with and trust the arrangement (Jones, et al., 2010), success in co-management remains hard to define. There is a multiplex of conditions that vary from case to case, and the goals of each case can be embedded in unique roots. This makes the local context of co-management an important factor to consider (Chuenpagdee & Jentoft, 2007). Social, cultural, political, economic and ecological goals are all legitimate and at stake in a co-management agreement (Clark & Joe-Strack, 2017) and success cannot easily be measured using one or all of these pillars. With this in mind, Gwaii Haanas remains yet a compelling case of co-management, where, after 25 years, the individuals involved seem to remain just as committed to making the agreement work as when it began. The way that it has evolved during its lifespan has sparked the research of many, including myself. In this study, I have chosen to look at the relationships present in the agreement, as I feel that there is a social pillar here that is critical to the life of the Gwaii Haanas Agreement. More specifically, the way these relations are situated in a set of commitments rooted in culture, norms and values make it an apparent success story worth investigating.

2.4.2 Gwaii Haanas today

The Gwaii Haanas Agreement mandates that the Government of Canada and the CHN collaborate on an Archipelago Management Board (AMB), which is currently comprised of

three CHN members and three Government of Canada members (1 from DFO and 2 from Parks). The AMB is required to meet monthly and operate solely on consensus-based decisions (The Gwaii Haanas Agreement, 1993), however, it is arguably impossible for any law or agreement to mandate that people foster the kind of meaningful, productive relationships that appear to be imperative to successful co-management. Those involved in the Gwaii Hanaas agreement have expressed an interest in improving these relations as they are today. In 2016, a draft of the Land-Sea-People Management Plan was released that brought forward the desire to improve the relationships between the co-management groups. This document was written as a joint initiative between the CHN and Government of Canada and highlights the potentially lacking relationships that are present between the partnering organizations. Specifically, objective 1.1 and target 1.1.4 are of interest, which directs attention to the need and desire to strengthen the ties amongst the Government of Canada and the CHN:

> Objective 1.1: "Strengthen the relationship between Haida Nation and Canada".
>
> Target 1.1.4: "Collaborative work by employees of partner organizations on Gwaii Haanas management and initiatives increases by 2025."

This research has been designed to help address these points from the newest management plan in collaboration with partners from Parks Canada and CHN, who were closely involved in the development of the draft Land-Sea-People plan. Accordingly, an emphasis here will be on producing research products that assist the AMB and the Gwaii Haanas community of practice to achieve these goals.

3 METHODOLOGY

This research's objectives and questions were approached from two angles: community well-being and the social network of the Community of Practice (CoP). In order to understand the well-being of the co-management community of practice, the five-dimensional framework discussed in section 2.2 was used to guide an analysis of the text in the Gwaii Haanas Agreement. The text analysis of the Gwaii Haanas Agreement helped to identify whether each dimension was present in the actual text of the co-management agreement. With well-being being difficult to measure because it involves both subjective and objective dimensions, the five-dimensional framework was also used as a tool to gauge well-being amongst the co-management community from the perspective of those who are a part of it. Individuals who were asked to participate in this part of the research were tasked with assessing whether or not they felt that the five dimensions were truly present in the community. This approach was used as a 'ground truthing' tool, so to speak, to give us a better, more realistic look at how the co-management agreement has evolved beyond the 1993 mandate from a well-being perspective. The second approach to this research gathers social network analysis data to determine who is connected to whom. A social network analysis was completed to yield answers pertaining to just how connected the network is, and where collaboration is occurring as well as where it is not. The latter portion of the research will hopefully aid the co-management community in achieving their collaboration goals as outlined in Target 1.1.4 of the Land-Sea-People Management Plan Draft (2017).

Prior to beginning the research, participants were identified by management staff from each organization as having work related to Gwaii Hanaas, and that work being of a collaborative nature. Each individual from the Gwaii Haanas office was asked "In your current position at Gwaii Haanas, have you worked with anyone from DFO or CHN over the past 2 years?". If the individual responded yes, they were assigned as a participant in the research. If no, they were not considered any further in the research. It was suggested that the individual would have experienced this collaborative work within the past two years and that all questions were answered as a product of the past two years, meaning that if a collaborative initiative took place three years prior, it would be irrelevant unless the collaborative relationship continued

into the more recent history. Two years was selected to help gain a perspective on the current relationships without reaching too far back, as the goal here is to provide baseline data of the present.

A total of 47 individuals participated in this research. 27 from Parks, 8 from CHN and 12 from DFO. A full table of the response rates can be seen below in Table 1. Seven individuals participated in the community well-being heat diagram portion of the research, 3 from Parks, 3 from CHN and 1 from DFO. 'Null response' indicates where individuals self-identified as not being involved in Gwaii Haanas management, even if someone else identified them as a connection. For the purposes of analysis, these individuals are not used for calculating the effective response rate, but as nodes they are used in the calculation of social network statistics. It is important to keep the participation rates in mind when going through the data analysis, as there were so few CHN and DFO participants that some measurements are not indicative of the bigger picture. This is especially important when analyzing the organization specific results.

	Total identified by partners	**Total number of Participants**	**Null response**	**Participation Rate**
Parks	40	27	11	95%
CHN	25	8	5	53%
DFO	26	12	2	54%
Total	91	47	18	71%

Table 1: Questionnaire participation rates

Demographic information about each participant was also documented. Each person was asked to identify as male or female, select the age range in which they belong to, identify or confirm their position title as well as determine how many years they had occupied their current position and how many years they have been involved with Gwaii Haanas management (Appendix A). Of the 47 people that were interviewed, 21 male and 26 female, the most popular age range selected was 35 to 44 years of age, years in position ranged from 1 month to

21 years, and years involved in Gwaii Haanas management ranged from 1 month to 38 years (See Appendix B).

3.1 A five-dimensional framework for community well-being

Wilkinson (1991) discusses the meaning of community well-being, and connects it to not only the psychological, cultural and social needs of the community, but also the individual and family. He argues that one's community is the epitome of social well-being, stating that "the community represents a broad range of the direct interpersonal contacts that produce social well-being" (Wilkinson, 1991, p. 78). Community and social well-being are tightly intertwined, and here I am exploring these linkages further by applying his definition and framework to a community of practice. While I understand that the exact same linkages may not exist among the well-being of the community of practices and the social well-being of those within that community, Wilkinson's five categories are nonetheless relevant to evaluating the effective functioning of a community of practice, and particularly for a co-management community of practice given the details of co-management discussed above. To reiterate, the five categories are as follows (see Literature Review for more details)

1. Distributive justice: the removal of inequalities, facilitation of communication and interpersonal responses
2. Open communication: transparency, efficient and authentic communication
3. Tolerance: multiple ways of knowing, accepting and respecting differences and similarities
4. Collective action: working together in pursuit of common interests
5. Communion: consciously realized relationships, sense of community and shared interests

While Wilkinson suggests these elements of social well-being apply to a rural community, it is argued here that they can be likewise be applied to any community of practice.

First, I used these five categories as a framework for analyzing the mandates set out in the Gwaii Haanas Agreement. This involved coding each section of the agreement for each

occurrence of specific steps or requirements that relate to one or more of these categories. For example, if a section of the agreement were to discuss information-sharing requirements, this would be coded as addressing open communication; similarly, if the document addresses diverse or conflicting viewpoints, this would be coded as tolerance.

Next, the five categories were used as the basis of a heat diagram (Figure 3) for use during interviews with key participants. The focus of this exercise was to gauge a better understanding of how organizations interact from a broader scale, as opposed to the individual relationships occurring within and amongst organizations that the social network analysis focuses on. Each participant was asked to consider to what extent they perceive these five elements to be present in their own organizations relationship with the other two partnering organizations. For example, a Parks participant would complete one diagram for Parks relationship with CHN, and a separate heat diagram for Parks relationship with DFO. Participants would rate the presence of all five elements on a scale of one to three. A ranking of 1 indicates that little to no emphasis is placed on this condition in the relationship, or the presence of this condition in the relationship is considered weak; a ranking of 2 signifies medium emphasis or medium presence on the given condition; and a ranking of 3 means that the condition in question is strongly emphasized or has a strong presence in the relationship. Along with assessing organizational relationships for each condition, individuals who participated in the heat diagram component were also asked to provide an example of something that came to mind as a reason for assessing the relationship the way they did. For example, CHN may rate their relationship with DFO low (1's and 2's) and credit it to historical disputes and continuing tension between the two organizations. On the other hand, CHN may consider their relationship with Parks to be slightly higher (2's and 3's) than theirs with DFO because of the strong partnership that has occurred between the two organizations throughout the years.

Participants for this portion of the research were selected upon time availability, length of career spent on Gwaii Haanas as well as the individuals level of involvement with Gwaii Haanas. The placement in the hierarchical structure and the collaborative nature of the individuals working role were also considered. Individuals who participated were typically quite involved in the cooperative management agreement or frequently collaborated with the other organizations involved regarding Gwaii Haanas. Typically, these individuals were

higher up in organizational hierarchies or have been a member of the community of practice for decades. Ultimately, however, participation for this exercise came down to time and availability of each individual as this portion of the interview was typically much more time consuming (~30-45 minutes on average) than the social network portion.

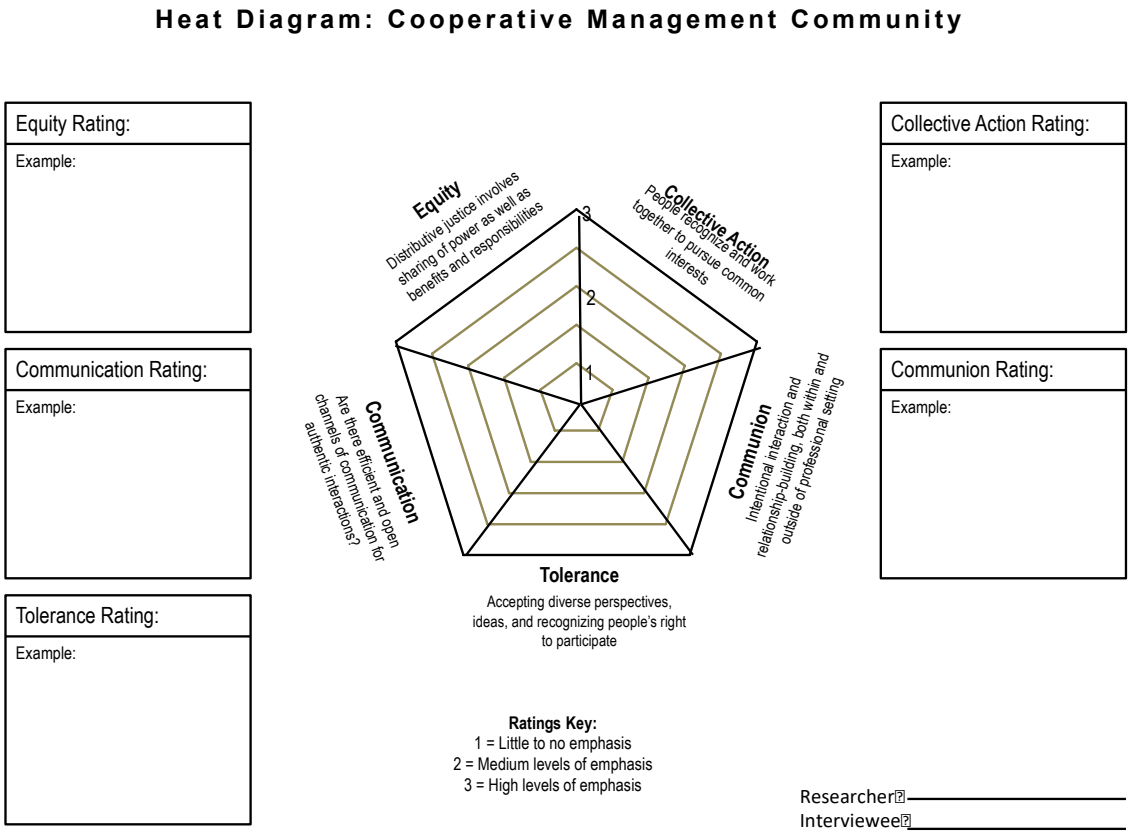

Figure 3: Heat Diagram. A heat diagram constructed out of Wilkinson's five criteria for well-being.

These results were used to inform the state of the relationships from a broader community perspective. The social network portion zooms in on these relationships and focuses in on individual level by looking at personal relationships.

3.2 Social network analysis

A network is the set of relations between actors, where an actor can be an individual, organization, a community or any other entity that acts together. A social network requires

only two people and considers the emotions, ideas, power and health that may flow through these networks (Kadushin, 2012). The aforementioned resources, among other assets, are accessed through these social networks or relationships, and are cumulatively known as social capital (Mouw, 2006). Access to social capital can be traced through social networks and mapped accordingly through a social network analysis.

For the social network analysis component of this research, a questionnaire (Appendix A) was administered through an interview to gather data on who is connecting with whom and for what reasons these individuals connect. The interviews began with the Gwaii Haanas Parks Canada branch in Skidegate, B.C, each participant was given an hour time slot to discuss their thoughts and answers with me, however this portion of the data collection process typically concluded within 30 minutes. Each participant was asked to provide the names and organizations of the individuals they connect with on a professional level regarding the management of Gwaii Haanas. It was asked that participants considered naming only three to five individuals that they considered to be most important to their job, however, if the participant felt strongly that more, or less, individuals should be named it was typically accepted at the discretion of the interviewer. For each person listed, the participant answered four questions geared towards characterizing their working relationship. DFO and CHN participants were identified through the lists of people provided from the initial Parks Canada interviews.

Question 1 of the questionnaire addresses how often the individuals interact. It reads: How frequent are your professional interactions with this individual? The answers for all four questions are scaled from one to three. In this case, answering 1 means the individuals interact rarely (twice/year or less), answering 2 indicates they interact regularly (twice/year, less than once/month) and 3 means they interact frequently (once/month or more). This question is relevant through Granovetter's (1973) assumption that the more frequently people interact, the stronger their ties or relationship is. After consulting with our partners at CHN and Parks, it was decided the terms would deviate slightly from Granovetter's definitions (see page 20) as it is difficult to classify a connection with a co-worker as "important" under Granovetter's definition of interaction on a rare basis (once/year or less). Thus, all three time spans associated with their terms were modified to better suit our research intentions.

Question 2 relates to the type of interaction taking place, whether it be informative, consultative or collaborative. This question stems from Sen and Nielsen's (1996) work discussing different categories of co-management depending upon the power structure at hand. According to Sen and Nielsen, a co-management arrangement typically fits into one of five categories: instructive, consultative, collaborative, advisory or informative. In order to maintain consistency throughout the number of answers available for each question, the five options were narrowed down to just three possible answers in the questionnaire, with 1 being informative, 2 being consultative and 3 being cooperative. Each person was asked to determine his or her power relationship with the individual being discussed.

The third question of the questionnaire is directed at characterizing the strength of the relationship between the participant and each individual he or she listed. Again, built upon Granovetter's 1973 work *The Strength of Weak Ties*, it is hypothesized that while strong ties are undoubtedly important, weak ties play an integral role in allowing a social network to spawn out much further than strong ties, ultimately accessing a wider range of social capital. It is through this question we can assess not only tie strength, but also consider whether it is a bridging, bonding or linking tie. Each participant was asked to rate each relationship as: 1, a weak relationship with little to no trust or expectations of reciprocity; 2, where some trusts exists or is building and expectations for assistance may or may not be there; and 3, where the tie is considered strong, trust is present and it is expected this individual will assist the participant when he or she is asked to do so.

The final question on the document aims to characterize the relationship even further by inquiring about the primary reason for the participant to interact with each contact he or she listed. This question helps us to understand whether or not we can expect these relationships to carry on into the future or if they are built upon a short-term trajectory. Again, the participants were presented with three different answers, 1 signified that the individuals interact due to a special project or deliverable they were working on, 2 meant that these individuals communicate on an as necessary basis, for example collaborating on a long-term management plan, and an answer of 3 showed that the participant considers the individual listed a close colleague with whom they interact with for a variety of reasons. Relationships with lower ratings would be less expected to carry into the long-term.

The results from this questionnaire not only provide data for a basic social network analysis based on the list of individuals each participant indicated, but also provide the information necessary to further characterize each social tie.

3.2.1 Social network data analysis

The data for the social network component was analyzed using UCINET 6 for Windows (Version 6.628) (Borgatti, S.P, et al., 2002) and NetDraw 2.160 (Borgatti, S.P, 2002). Various analyses were completed to understand the data at both the network level and the node level.

Network level measurements:

Network size (k) is understood as the number of actors in a network. Network size is often indicative of the network structure as it dictates the likelihood of an actor's ability to develop and maintain its ties. A smaller network is more likely to house connected actors, while it is more difficult to make and establish connections in a larger network.

Network Density is calculated by dividing the sum of all existing ties by the number of all ties possible in a network. In a directed network (where a direction of contact is known), network density is calculated *k*(k-1)* and in an undirected network (where the direction of contact is unknown) network density is calculated *k*(k-1)/2*. This provides a percentage of how many of the possible ties are actually present in a given network as well the extent to which dyadic ties (a tie between two actors) are present. More dense networks are able to diffuse information among its members while indicating the level of social capital or constraint present.

Reciprocity considers the direction of ties and provides information on how many of the ties present in a network are reciprocated. This is calculated by dividing the number of relations that are reciprocated over the total number of relations in a network. The reciprocity measurement is a good indication of the networks equilibrium, where networks with high amounts of reciprocity are likely to be more stable and/or horizontal in structure than networks with low amounts of reciprocity, which are likely to be hierarchical and/or unstable.

Homophily analyzes the tendency for actors within the network to connect with other actors within the network who possess similar traits or characteristics as one another. Homophily can be a product of gender, race, belief systems, age, status, and many other seemingly defining categories that may be present. If a network has heterophily characteristics, it indicates that there is little to no categorization or separation among different groups. Homophily is measured on a scale of -1 to +1, where -1 indicates perfect homophily, and +1 indicates perfect heterophily.

Transitivity is a way of characterizing the connections in a network. For example, if actor A and actor B are connected, and actor A and actor C are connected, then in a transitive network, actor B and actor C will also be connected. When one of these ties is missing, the triad is considered to be incomplete (Figure 4). When all connections in a triad are present, triads, or transitive triplets, are formed amongst the network. In a network where more completed triads are present, it is likely that "cliques" are present, often connected with homophilous traits. The outcome of transitivity is typically shown in percentages, with one measurement indicating the number of transitive triplets present in a network, and another indicating the percentage of triplets that are missing one link needed to complete the triad.

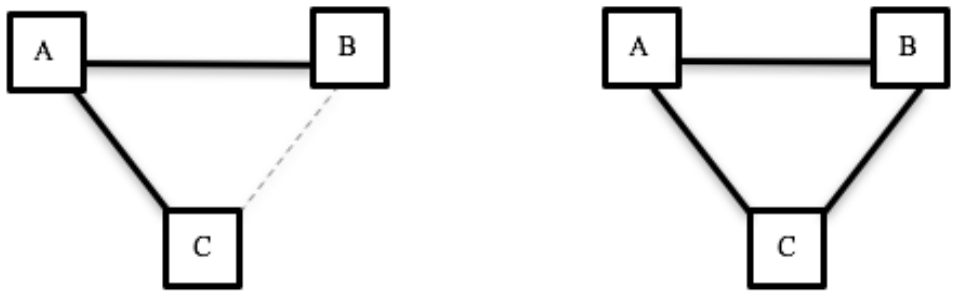

Figure 4: Triads: an incomplete triad versus a complete triad

Geodesic distance measures the average number of nodes on the most efficient path to get from one actor to another. The distance is based on an average calculation of the number of steps or nodes one individual has to take to get to another in the network. Additional distance measurements include the **compactness** or fragmentation of a network, where a result closer to

1 indicates a compact network and closer to 0 signifies fragmentation or an unconnected network.

Other network level measurements of interest are **cut-points**, where the removal of a node has potential to disconnect the network; **blocks**, where cut points divide a network into separate blocks; and **bridges**, where the removal of a tie between nodes would disconnect the network. These three measurements can help determine how vulnerable the network is to disruptions in the flow of resources and/or information.

Node level measurements:

Freeman centrality measures the number of connections an actor has. Actors with a high measurement of in-degree centrality are indicative of prestige or popularity, whereas actors with a high level of out-degree centrality portray a node with high amounts of influence over the network. More connections typically equip an actor with more power through increased access to information, resources and connections, however it does not always imply that well-connected actors are successful in connecting subgroups. The output of Freeman's degree centrality approach provides the amount of incoming and outgoing connections each actor in the network has, allowing us to hone in on influential or popular nodes in the network. In-degree and out-degree centrality measurements are given in the form of percentages of theoretical maximums, where a measurement of 100% would indicate perfect hierarchy.

Betweenness centrality looks at key brokers in a network, or those actors who have the ability to facilitate or prevent information from travelling through a network. Nodes that have a high level of betweenness centrality are considered "brokers". Betweenness centrality can also be considered through key ties in the network, where taking away a tie with a high level of betweenness would disconnect relations and isolate actors in a network.

3.2.2 Missing data

A large portion of the identified CoP population was not interviewed for various reasons. Due to the time constraints and the scope of this project, the sample was bound after the second round of social network interviews. That is, the first round of interviewees were identified by Parks, and then individuals who were identified by interviewees in the first round

were contacted for an interview, then new individuals that second-round interviewees identified were not contacted. Also, the organizations required that we provide them a list of people identified after the first round for them to edit as they saw fit (ie. identified/removed those who no longer worked in the organization or had changed positions recently). Four individuals were added to the contact list and seven were removed during this stage. The low response rate that was experienced in the second round was attributed to actor non-response (or unit non-response) as well as out of office or fieldwork commitments. Cases were considered to be "null" when individuals responded with a statement indicating they do not have further information to offer in regard to this research, or, in other words, these individuals identified themselves as not having any ties to the Gwaii Haanas co-management network.

Additional missing data can be attributed to partially finished interviews, where our time was interrupted or terminated by the participant. In these four scenarios, missing portions of the data were handled by using an imputing average method. That is, for each organization, averages were derived for each response from the data collected using the imputing conditional means method as described by Huisman (2009). While using 'person means' could not be justified due to the inability to predict where and with whom the outgoing ties connect to, the average response for each question per organization was used to complete incomplete cases. In this case, we used averages derived from a 'hot decking' procedure (Huisman, 2009), where a participant had identified individuals with whom he or she collaborates with, but had not been able to complete the questionnaire for one reason or another, so the averages served as a type of stand-in donor for the response of a particular actor. Huisman (2009) studies show that imputing methods are effective for small to medium amounts of missing data, but increasingly misconstrue results with higher amounts of missing data. Due to the large amount of missing data as a result of non-response in this research, it was concluded that utilizing average imputations beyond the aforementioned use would compromise the integrity of the data.

4 RESULTS

4.1 Missing data

From the initial lists provided from our partners at each organization, four individuals were added to the contact list and seven were removed by the affiliated research partners during the editing stage. The low response rates I experienced from those on the contact list was mostly due to actor non-response (or unit non-response) as well as out of office or fieldwork commitments.

The hot decking procedure used to handle missing data resulted in the average number of outgoing ties per person. For a Parks participant, the average number of contacts within his or her own organization is 8 (a total of 205 Parks individuals were identified, divided by the total number of Parks participants, 27), and the average response for each question in the questionnaire was 3. This same assessment was completed for each organization (Table 2). Average response rates were assigned to situations where partial data were missing.

Parks	**Organization**	**Avg. contacts/person**	**Q1**	**Q2**	**Q3**	**Q4**
	Parks	8	3	3	3	3
	CHN	3	2	2	3	2
	DFO	2	2	2	3	2
CHN	**Organization**	**Avg. contacts/person**	**Q1**	**Q2**	**Q3**	**Q4**
	Parks	4	2	3	3	2
	CHN	6	2	3	3	2
	DFO	1	2	3	2	3
DFO	**Organization**	**Avg. contacts/person**	**Q1**	**Q2**	**Q3**	**Q4**
	Parks	2	2	3	3	2
	CHN	1	2	3	3	2
	DFO	2	2	2	3	2

Table 2: Table of imputed averages for missing questionnaire data

4.2 Questionnaire

484 ties were detected in the network spanning Parks, CHN and DFO. The results are analyzed both as an overall network, which includes all three organizations, and also as organization-organization networks, resulting in three separate networks. The vast majority of ties (47%) occur between Parks and CHN employees. Parks and DFO had the next amount of ties occurring between the two (39%), and finally the least amount of ties exist amongst DFO and CHN individuals (14%) (Appendix C). The results are shown in more detail in Appendix C and D. Question 1 asks about frequency of interaction where 62% (300 out of 484) indicated that they communicate with their identified contact frequently, 28% (135 out of 484) identified their communication as regularly, and a small fraction (10%) suggested they communicate rarely. When these numbers are analyzed at an organizational level, we can see that the DFO and CHN relationships are characterized by less frequent interactions than Parks with CHN and Parks with DFO (Appendix C).

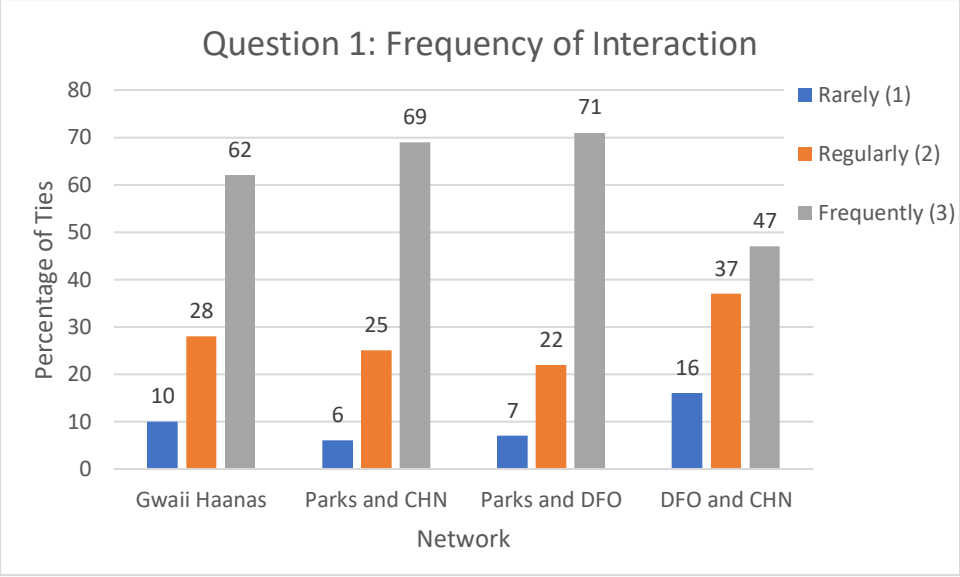

Figure 5: Response data for Question 1 (in percentages)

Question 2 is geared towards assessing the dynamic of the relationship the participant has with the contact, whether it is informative, consultative or cooperative. The network as a whole indicates that 59% of the interactions taking place are cooperative, 33% consultative,

and 8% of all interactions in the network were characterized as informative (Figure 6). On an organization-to-organization relationship level, the response was relatively synonymous with the network level results (Appendix C)

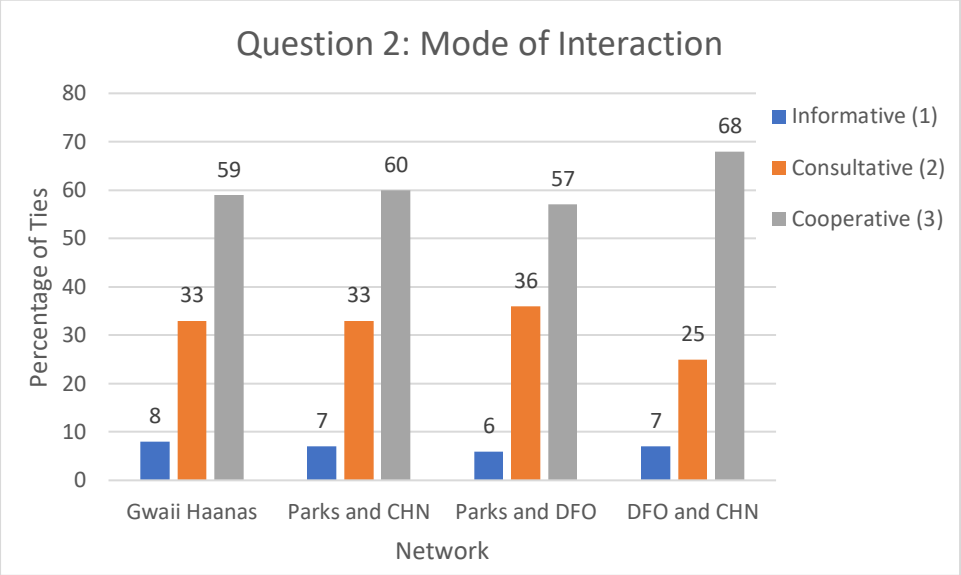

Figure 6: Response data for Question 2 (in percentages)

The response for question 3 sees three quarters of the overall network stating they have strong ties with their contact, 22% characterized their relationships as medium strength and a minute 3% indicated they have a weak relationship with a specified contact (Figure 7). The relationships at an organizational level essentially mirror these results, with very low percentages of weak relationships documented (Appendix C).

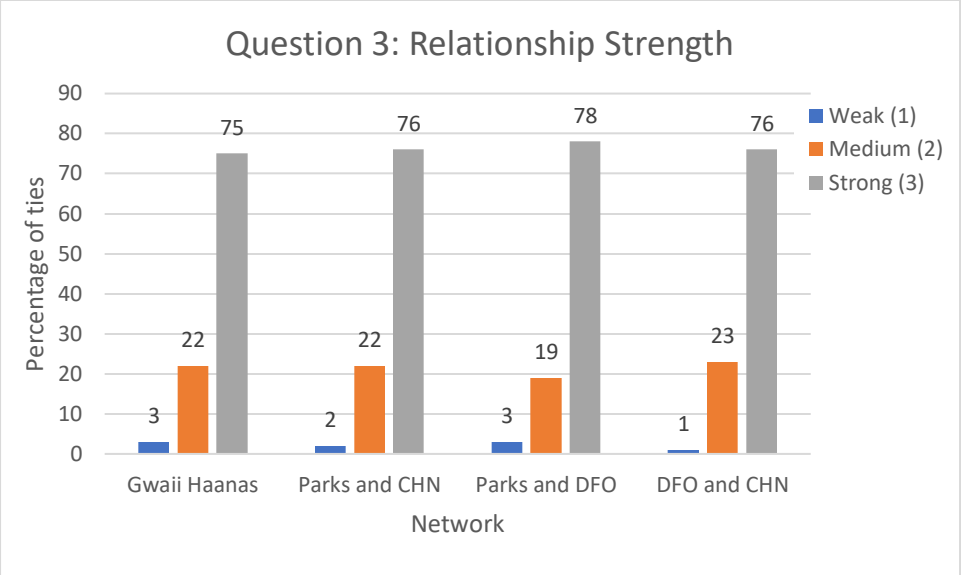

Figure 7: Response data for Question 3 (in percentages)

The final question, question 4, discusses the primary reason for interaction. Special circumstance registered as the least selected choice, as necessary and close colleague were both selected relatively evenly in the network as a whole (Figure 8) as well as on an organization-to-organization level, both hovering just over the 40% mark. The least amount of 'close colleague' relationships exist between DFO and CHN, with 37% of the ties falling under that classification, while Parks appears to have the most 'close colleague' relationships amongst ties with their counterparts at CHN and DFO, at 46% and 45% respectively (Appendix C).

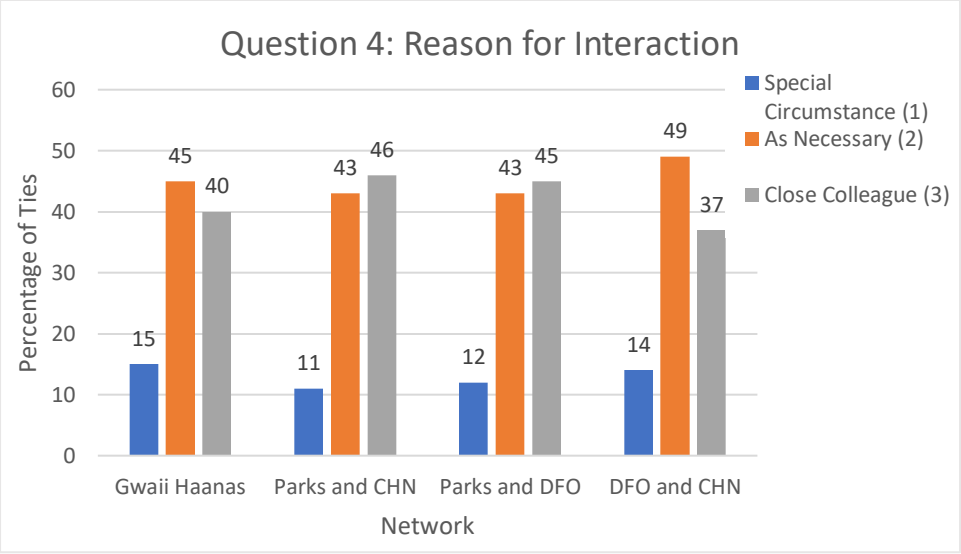

Figure 8: Response data for Question 4 (in percentages)

4.3 Community well-being

I analyzed the text of the Gwaii Haanas agreement from the perspective of community well-being, as described in section 3.1. The intent was to discover whether any of the five dimensions of community well-being (i.e., open communication, distributive justice, tolerance, collective action, communion) are mandated by the agreement. In summary, I identified text that make specific reference to four of the five categories, with communion being the only dimension not specifically discussed (Table 3).

Category	Gwaii Haanas Agreement
Distributive Justice The acknowledgement that all people are equally human. This results in removal of inequalities, facilitates communication and encourages affirmative, accurate interpersonal responses.	*"3.4 This Agreement provides for the establishment of a management board,…, whereby both parties will share and co-operate in the planning, operation and management of the Archipelago respecting both parties' designations in the spirit expressed in this agreement."*
Open Communication Having efficient and open channels of communication for authentic interactions contribute to the well-being of both the individual and the community	*"4.2 In a spirit of full and frank disclosure, both parties agree that they will refer any step, activity, or development that affects the planning, operation and management of the Archipelago to the AMB for deliberation…"*
Tolerance Accepting and therefore respecting the differences and similarities among all humans	*"Notwithstanding and without prejudice to the aforesaid divergence of viewpoints, and in recognition of the convergence of viewpoints with respect to objectives for the care, protection and enjoyment of the Archipelago, the parties agree to constructively and co-operatively share in the planning, operation and management of the Archipelago,…"*
Collective Action People working together in pursuit of common interests	*"5.1 Deliberations of the AMB on any particular proposal or initiative will strive in a constructive and co-operative manner to achieve a consensus decision of the members,…"*
Communion Consciously realized relationships contribute to social well-being through encouraging equity, openness, tolerance and collective action.	An example of communion could not be found in the Gwaii Haanas Agreement.

Table 3: Community well-being categories identified in the Gwaii Haanas Agreement.

Seven participants were asked to speak directly to the presence of these five elements in their interviews, and provide examples of each element if one came to mind. Being that the sample number here is only a fraction of the total participants, I do not treat these findings as 'representative' of the CoP as a whole, but draw from them to ground-truth findings presented in Table 3. Following the premise of grounded theory that 'everything are data' (Glaser, 1998), I also rely on informal observations provided by the other 40 for ground-truthing of the findings. In total, 1 person from DFO participated in this portion of the research, 3 from Parks and 3 from CHN. DFO was the least represented in this portion of the research due to the fact that DFO employees involved in Gwaii Haanas management are spread out all over B.C's coast, and only 1 of DFO's 12 respondents were able to do an interview in person. With this part of the research being less straightforward and much more time consuming than the questionnaire portion, it was important to conduct in person to avoid confusion or any misunderstandings.

People's comments when completing the well-being diagram suggest that overall, the weakest dimension present in the community is equity. Communication was also rated as weaker than other categories (Appendix K). Organizationally, DFO appears to contribute the least to the well-being of the co-management community, with the perception by CHN and Parks interviewees being that the DFO is reluctant to embrace their role in the Gwaii Haanas Agreement, stating that "DFO is uninterested in pursuing Gwaii Haanas". The participants from CHN and Parks acknowledge that DFO does willingly listen to the thoughts and opinions of those involved in the Gwaii Haanas Agreement, however, they also described their perception that DFO remains inflexible to change. A major point of contention here noted by interviewees is that DFO employees often do not fully understand the culture of Haida Gwaii, having "no presence in the community", and that whatever equity experienced here is a "more of a reflection of the mandate than actual will". This makes it difficult for the Haida and DFO to see eye to eye on many topics. For example, one interviewee explained that DFO places the interests of the commercial fishing industry above ecological integrity and preservation, which contributes to a fundamental mismatch of belief systems. It is nevertheless the hope of many of those that I interviewed that DFO will evolve to have this understanding as time goes on.

Some of those interviewed from DFO admittedly stated that they are working on strengthening the state of their collaborative relationships, "one of the struggles we're (DFO)

having is making these links. We're trying to develop more mechanisms to work with [our partners]". Almost all DFO participants made note that they felt the collaborative effort from their organization is improving, as a whole, and that involvement with Gwaii Haanas is increasing.

Tolerance and collective action were noted as the two dimensions that have the strongest presence in the community and the actions of Parks have a seemingly positive contribution to this. The results indicate that the organization is well respected by their peers and their own employees, as their longevity in the agreement has allowed trust to naturally grow with the CHN, and their long-standing working relationship with the DFO permits trust there, too. A primary contribution by Parks to the community well-being of the network is the employment of Haida people. This allows Parks, the most central organization in the network, to gain the respect of others in the community as a virtue of staffing Haida individuals. This increases the potential for the organization to not only better understand Haida culture, but also make decisions that are informed directly by the Haida people.

With that being said, the characteristic that seems to contribute the most to community well-being in the Gwaii Haanas community of practice is the willingness of outsiders to understand Haida values and practices. It was suggested by many that this cross-cultural competency and openness is a critical ingredient towards real relations and cooperation. All participants made some mention of how an individual's presence in the Haida community is directly reflected in how well the individual understands and respects Haida culture and how positive or strong their relationships are with others on the island. The more an individual, or an organization, understands these characteristics, the more valued and respected he/she or the organization becomes in the community. These like-minded individuals make up the core of the Gwaii Haanas community of practice as their goals and values align to inform the best possible decisions for the preservation and protection of Gwaii Haanas as well as contribute to the well-being of the co-management community in all five theorized dimensions.

4.4 Social network analysis

For each of the SNA statistics noted in the methods section, I analyzed seven different networks; 1) the network as a whole, 2) the network between DFO and Parks, 3) the network

between DFO and CHN, 4) the network between Parks and CHN, 5) the isolated Parks network, 6) the isolated CHN network, and 7) the isolated DFO network. This approach enables comparisons and evaluations of the network from different perspectives. A full table of all network statistics can be seen below in Tables 4 and 5.

The fully mapped network consists of 131 nodes. The first statistic evaluated here is network density: only 7% of all possible ties that can exist, actually do. With this network being comprised of individuals from three different organizations, it is unlikely that any one individual would have ties with all 130 others in the network. As networks grow in population, the density typically decreases; smaller networks of, say 10 people, might be expected to have a high density of perhaps even 100%. Therefore, density is best used as a comparative tool (Borgatti, et al., 2013). CHN's standalone network has the highest density at 29%, compared to 18% for Parks and 8% for DFO (Table 5). CHN also has the smallest reported network size, which is likely the reasoning behind the organizations increased level of internal connections.

Geodesic distance measures the least number of nodes one individual has to go through to reach any other individual in the network (Hanneman and Riddle, 2005). The measurement is indicative of how connected the network is and how effective information can travel through the network. Here, I report the average geodesic distance for each network, which corresponds with how many nodes an individual would have to go through, on average, to get to another node in the network. The average geodesic distance for the network as a whole is 2.7 (rounded to 3) with a compactness value of 0.15 (Table 4). Here, the compactness level is nearing zero, which is a characteristic of a disconnected network. Regarding geodesic distance, the average individual has to go through 3 other people in order to get in touch with another individual in the network. These measurements show that, again, the CHN network is the most connected with an average geodesic distance of 1.64, compared to 2.4 for Parks and 1.9 for DFO. (Table 5).

Organization-Organization relations

Measurement	**Result**			
	Overall Network	DFO & Parks	DFO & CHN	Parks & CHN
Network Size	131	100	55	88
Density	7%	8%	8%	13%
Total ties present	1219	795	245	961
Total ties possible	17030	9900	2970	7656
Reciprocity	24%	26%	17%	25%
Transitivity	11%	9%	12%	13%
Average geodesic distance	2.69	2.71	2.52	2.46
Compactness	0.15	0.16	0.09	0.18

Table 4: Social network analysis results between organizations

Inter-organization relations

Measurement	**Result**			
	Overall Network	Parks Network	CHN Network	DFO Network
Network Size (k)	131	58	22	28
Density	7%	18%	29%	8%
Total ties present	1219	585	135	62
Total ties possible (k*(k-1))	17030	3306	462	756
Reciprocity	24%	27%	22%	12%
Transitivity	11%	12%	20%	3%
Average geodesic distance	2.69	2.40	1.64	1.89
Compactness	0.15	0.22	0.19	0.07

Table 5: Social network analysis results for each organization

'Total degree centrality' describes the number of connections that a node has within the network. In this case, I used the Freeman's Centrality measurement to determine which actors had the highest out-degree (outgoing connections), and which actors had the highest in-degree (incoming connections). Typically, a higher amount of ties means that an actor is more powerful of an agent in the network via their ability to obtain and share information and resources amongst the network. The degree, shown in Appendix H, indicates the probability of a random actor taking a path through the network that goes through a given node (Borgatti et al., 2013). In the network as a whole, the actor with the highest amount of outgoing ties is node 135[3], with an out-degree of 112, and the actor with the highest incoming connections is node 155, with an in-degree of 56. Node 135 has the highest out-degree centrality by 26 units, however the in-degree measurements indicate that there are two other nodes, node 157 and 120 that have measurements within 11 units of the leading node. So, while node 135 dominates the in-degree measurements, there are three actors that are prominent in the out-degree category. Notably, both leading actors here, node 135 and 155, are consistently identified as central nodes in any given centrality measurement (Appendix H & I) indicating their prominence and importance within the network (Figure 9).

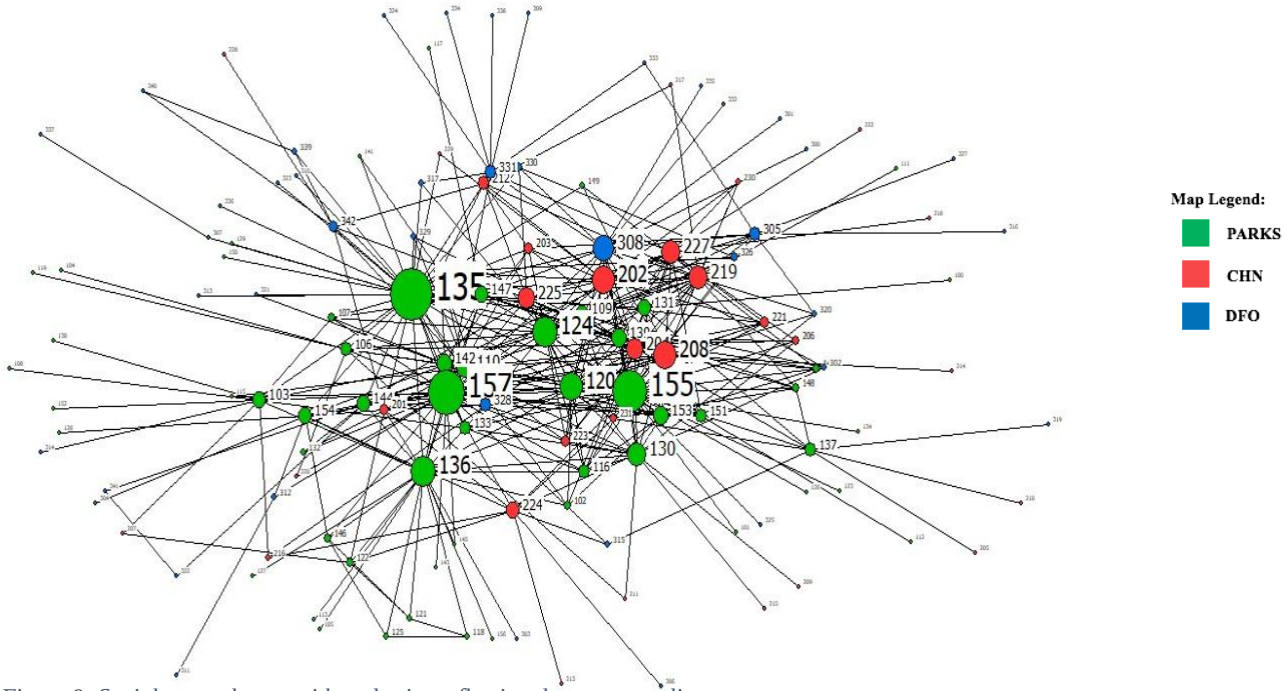

Figure 9: Social network map with node size reflecting degree centrality

[3] Nodes are sometimes referred to as a three-digit number. These numbers reflect the individuals home organization, where nodes beginning with 1 indicate a Parks member, 2 a CHN member, and 3 a DFO member.

'Betweenness centrality' (Freeman 1979) is a measure of "how often a given node falls along the shortest path between two other nodes" (Borgatti et al., 2013, p. 180) and is used to determine which actors have a strong broker presence or, in other words, connect the network. While 43 of the 131 of the actors in this network have some brokerage characteristics, only the top ten were reported as the statistical significance of other brokers in the network does not span out much beyond these individuals. Specifically, node 135 has the potential to be responsible for 10% of the betweenness in this network, as it is located on the geodesic path from one actor to another 1679 times. Node 157 and 136 are also important brokers in the network, both located on geodesic paths upwards of 1000 times, or 8% and 6% of the network betweenness, respectively. There is a slight drop in betweenness centrality following the fourth most central node, 155, and after the top 10 nodes the percentage of potential broker connections drops down to 1.4%. The overall network centralization index is 9.6%, indicating the network is sparse, which further reflects the network's horizontal structure and lack of density. However, it should not be overlooked that the four nodes with the highest level of betweenness centrality make up 30% of the connections in the network, possibly placing them in very powerful roles in the network (Appendix I).

Cutpoints, identified as any node that would divide the network into different parts if removed, and blocks (also known as bi-components), known as what the network is divided into as a result of removing a cutpoint, are indicative of how well the network is connected and how resilient the network can be to the removal of a central node (Hanneman & Riddle, 2005). In this case, there are 22 nodes that are cutpoints, which result in 56 different blocks (Figure 10, Appendix F & G). This means that if all 22 cutpoints were removed from the network, the network would be divided into 56 separate components. Most of these bi-components are comprised of two to three individuals, however there is one cutpoint of major significance that results in a bi-component of 75 actors (Figure 11).

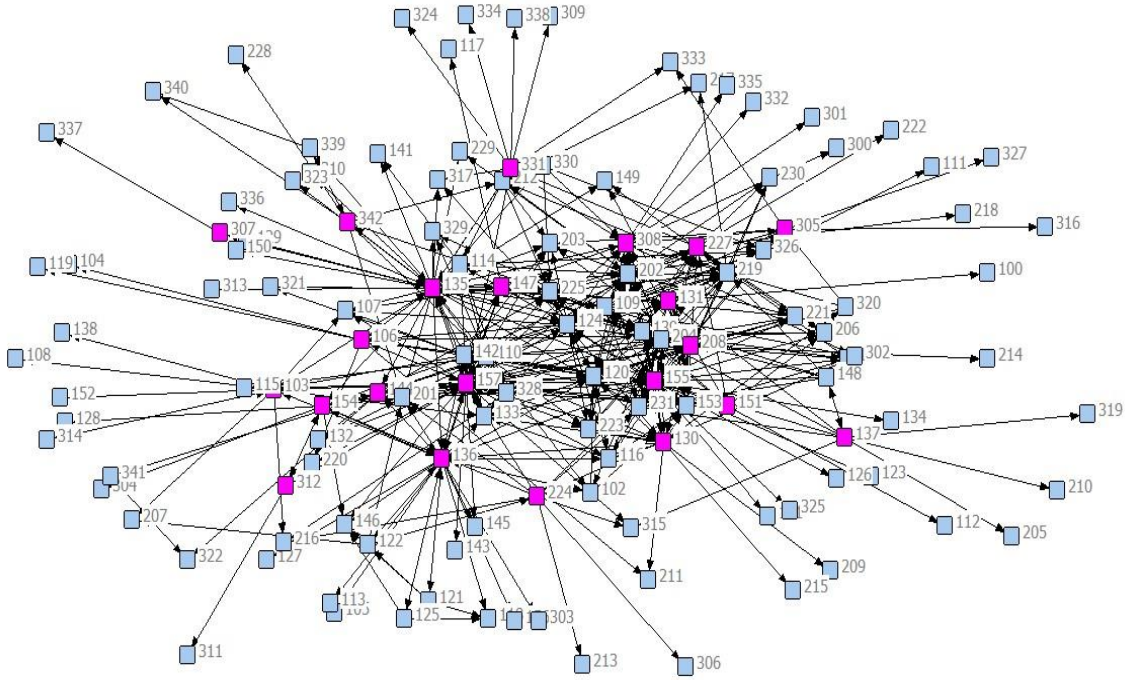

Figure 10: Cut off points. A map of the cut off points in the network (cut off points highlighted in pink)

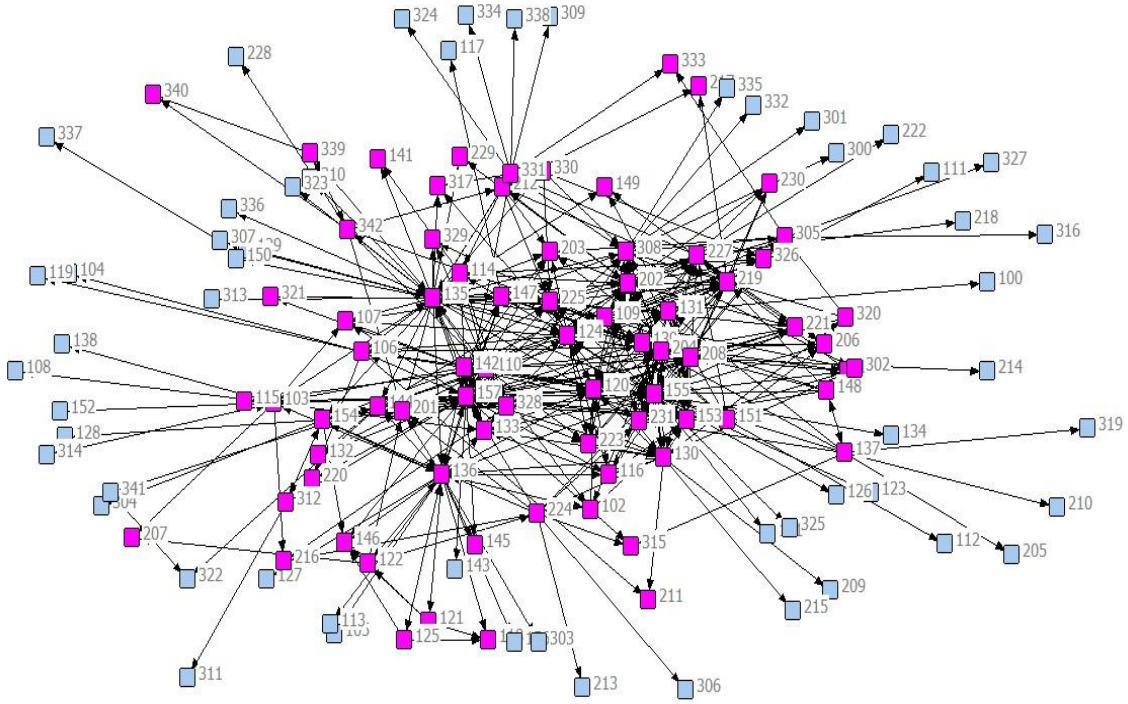

Figure 11: Cut block 54. A map of block 54 in the network which results in the isolation of 75 actors (members are in pink, isolates are in blue).

The transitivity measurement, which describes the level of connectivity in the network, indicates that only 11% of the relationships are transitive. That is, 11% of all connections have a completed triadic relationship, signifying that AB, BC, AC are all connected (Figure 4). Further, 31% of the potential triads are missing only one link necessary to become a completed triad. It is argued that completed triads, or high amounts of transitivity present in a network, can create an equilibrium amongst the network that increases its stability (Hanneman and Riddle, 2005). In this particular network, the CHN has the highest amount of transitivity, with 20% of the network having completed triads, arguably making the organization more stable than either Parks or DFO, where only 12% and 3%, respectively, of the connections form triads (Table 5).

Reciprocity, where an individual who identified an actor as a contact was also listed as a contact by that actor, is also a telling sign of network stability. In the case of this particular network, it is difficult to interpret the reciprocity results, as the study was bound at two rounds of sampling. However, with the individuals who were contacted, 24% of the relationships in the co-management network were reciprocated (Table 4). Had more rounds of interviews taken place, it is possible this percentage would have increased.

5 DISCUSSION

This discussion leads off with a look at the Gwaii Haanas network. The goal of this section is to provide an overview of exactly what the larger scale network looks like prior to discussing the relations within the network on a more refined scale. This includes a map of the entire network as detected in this research, as well as an explanation of why the map appears the way it does in terms of structure, hierarchy, and other network characteristics that factor into the network composition. The second section within the discussion focuses on exactly what the ties in the network are comprised of in terms of tie strength, the type of interactions occurring in the network and how often interactions between individuals in the network occur. The third section in the discussion looks at the relations between the three organizations that are a part of the Gwaii Haanas Agreement. This section provides an in depth look at how the research suggests the organizations operate in terms of each Agency's agenda for Gwaii Haanas and how differing organizational values play a role in how the Gwaii Haanas network functions as a whole. The fourth section discusses communion, which was discovered here as being an important factor in the success of the Gwaii Haanas Agreement, and how informal interactions play a large role in the relationships that have formed in the CoP. Lastly, the discussion concludes with remarks on the participation rates in this research and if they affected the research, and, if so, how it was addressed.

5.1 Network structure

The results from all 47 interviews show that, overall, the network structure for the co-management community is spread out, horizontal in nature, and relatively disconnected. The results indicate that there may be a lack of flow of communication and resources between organizations and even within organizations to some extent (Figure 12).

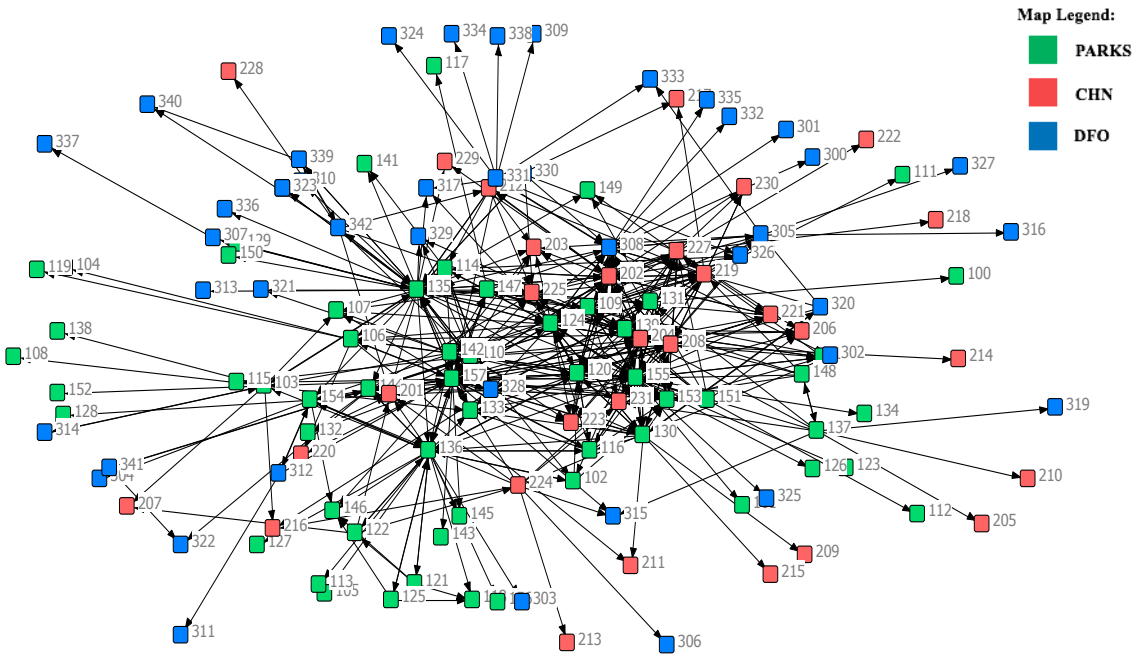

Figure 12: Social network for Gwaii Haanas co-management

Participants in this research commented on these issues, attributing existing communication challenges in part to the dissimilar organizational structures across the network, and in part to the vast proximity in which these organizations operate (discussed in section 5.2). CHN, for example, has a very different organizational structure than either government entity, and both government parties have structures that vary greatly from one another as well. For example, a biologist at Parks may have to go through a chain of people to find out who their counterpart at a partnering organization is (DFO or CHN), or, the difference in organizational structures may also mean that there is not a straightforward counterpart across organizations. The Parks structure sees the designated Superintendent holding a great amount of authority, whereas DFO does not have a similar position with such authority, meaning that the authority is more distributed throughout a chain of people, some of which may not consider themselves involved in Gwaii Haanas management. The communications arm of DFO has a hole, according to a participant, making it challenging to collaborate or communicate. Another mentioned that there is lots of communication with DFO, but that "it's just not always the same person. People and things are always changing on their end". In the case of CHN, it is a localized, private entity that has a clear hierarchical structure with the

president holding a vast amount of power, somewhat similar to a Parks Superintendent, but without the larger entity behind it. These inconsistencies between structures may likely contribute to challenges in communication and coordination of activities. One participant noted that she, herself, is "curious about equivalents, about who is across from them [in another organization]", going on to say that it would be helpful to hold a 'speed-dating' event where you have the opportunity to sit down with people you can potentially collaborate with.

The structural design of each organization's internal network can impede the success of co-management, specifically through hindering the flow of communication through a network (Argote, 2013; Granovetter, 2005; Reagans and McEvily, 2003). The flow of communication, or lack thereof in this case, is apparent through essentially all SNA measurements (Tables 4 & 5). For example, the density for this co-management network is very low (7%), suggesting that information does not effectively or efficiently travel through the network due to lack of connections. The network appears to rely on specific well-connected actors, or those actors with high amounts of social capital, to spread information and connect different nodes. The CHN, which has an isolated network density of 29%, is a relatively small organization in comparison to DFO and Parks, which both have lower densities in their isolated networks, at 8% and 18%, respectively. Hanneman and Riddle (2005) state that as networks grow in population, they are likely to become less and less dense, as we see here, increasing the likelihood and quantity of structural holes and decreasing the likelihood of information dispersing through the network.

These structural holes can often be filled by an individual playing a 'broker' role, where he or she is relied upon to connect a group of individuals with another group of individuals. Brokering, as defined by Wenger (1999), are "connections provided by people who can introduce elements of one practice into another" (p. 105). Brokers connect groups that would otherwise be disconnected often putting that person in a more powerful position to facilitate or prevent the flow of information in through a network. In this network, nodes 135, 136, 155 and 157 are potentially occupying some of these broker roles.

Network connectivity is a related measure, which is derived through measuring geodesic distances, or, in other words, the least number of nodes one must go through in order to connect to another actor in the network. With the Gwaii Haanas network being relatively disconnected, geodesic distances are greater between organizations as opposed to within

organizations. That is, on average there are fewer nodes to go through to reach another node within your own organization than another node outside of your own organization. CHN has the most compact network in the CoP which results in a smaller geodesic distance and arguably a more accessible internal structure than other organizations involved. CHN also had the highest amount of transitive relationships in their network, again indicating the organizations isolated strength. This can most likely be attributed to a few characteristics that are unique to CHN in this network, such as: almost all CHN employees are located on Haida Gwaii, with most working out of one of two offices; the strong sense of Haida community on the island often translates to professional relationships; and the private nature of the council in comparison to government entities. A CHN advisor to this research, when presented with the network diagrams, was immediately able to recognize structural features of their own organization (Appendix J).

Each organization involved in Gwaii Haanas co-management has their own internal hierarchical structure, but when it comes to the structure of the co-management network, it would appear that there is little evidence of any hierarchy, which is arguably ideal for co-management arrangements (Figure 12).

Everyone's role in the co-management network is to contribute knowledge that can facilitate the employment of best management practices. Aside from the 6 members of the AMB who take on more authoritative decision-making roles, when individuals take on their role in co-management, the work is more collaborative by nature. This finding is also evident in the questionnaire results, where it was found that over half of the connections in the network collaborate cooperatively as opposed to consultatively or informatively (Appendix C). The results from the social network analysis, such as homophily and centrality measurements, also show evidence of little hierarchy.

Homophily measurements inform if there are any bias's or cohorts formed based on specific attributes. The attributes considered in this research were: gender, age, organization, length of time within one's organization and the length of time spent in a specific position. The attribute indicating the highest amount of homophily was found to be within the DFO/CHN network when considering the organization attribute. This suggests that there is a strong preference for those from DFO to work with other members of DFO, and for those from the CHN to work with other members of the CHN, rather than a member from the partner

organization. Other noteworthy measurements here reflected heterophily, meaning that there is no grouping up of individuals with similar attributes. In this case, the attributes showing heterophily were the number of years one identified as being involved with Gwaii Haanas, and the number of years spent in current position. While heterophily was evident for these attributes in the network, it was particularly evident within the Parks network itself, illustrating that there is not a divide between veteran staff and newer staff, facilitating collaboration at amongst all staff members (Appendix E).

Centrality measurements indicate that the most central nodes in the network are consistent: nodes 135, 155, 157 and 136 (Figure 9, Appendix H & I). These four actors are responsible for almost one third of the connections in the network and both the betweenness centrality and Freeman's centrality measurements indicate these four nodes to be prominent individuals in the network. The central nodes are comprised mainly by Parks employees, where eight out of the top ten central actors from both the betweenness centrality measure and Freeman centrality measures are Parks employees. Note that this may be somewhat skewed due to Parks' high participation rate. Nonetheless, these central actors may represent points of vulnerability to the co-management community should they leave the organization.

There are just two points in the network where the removal of a tie would result in the isolation of more than two nodes. This suggests that the co-management network is arguably less vulnerable to changes or disruptions than a network that has blocks leaving many big groups isolated. So, while the network may be sparse and relatively disconnected, it has potential to be resilient in terms of members coming and going over time.

This network also gains strength from its structure and its inherent ability to facilitate capacity building. That is, the horizontal structure found in this network naturally enables individuals to form connections with other individuals that have higher levels of capital and authority. From a social capital perspective, these ties are referred to as linking ties. Linking ties promote "scaling up" in the network, which allows for individuals to establish connections that can ultimately result in obtaining a professional position with increased levels of authority. For example, a member from the CHN could potentially be in close contact with the Superintendent of Parks because of collaborating on Gwaii Haanas initiatives, and the nature of this collaborative relationship could result in the CHN member either scaling up within their own organization as a result of advanced ideas or knowledge, or potentially transferring over to

obtain a more authoritative role in the Gwaii Haanas Parks network. On a lesser scale, linking ties would allow this member of the CHN to access a large pool of social capital through his or her tie with the Superintendent, who holds one of the highest levels of authority in the network.

Additionally, the flat structure of the network promotes another sort of innovative tie known as a 'bridging tie'. These ties may be occurring between groups that would have remained disconnected if it were not for the co-management network. Bridging ties are relatively abundant here, likely a result of the Gwaii Haanas Agreement connecting nodes that would have been left disconnected if the Gwaii Haanas Agreement did not exist. While many bridging ties are formed through network 'brokers' (discussed in section 2.3), bridging ties can also be formed between two individuals not occupying a broker role. In some cases, individuals become efficient in establishing these ties and may take on a 'broker' role for his or her own subgroup (Burt, et al., 2013). The individuals who obtain these connections are more inclined to have increased levels of social capital as well as a higher probability of innovative ideas and novel opinions as a result of being introduced to unfamiliar ways of thinking. In the case of the Gwaii Haanas Agreement, the organizations behind DFO and Parks may never develop the same understanding of the cultural significance and the sacred nature of protecting the Gwaii Haanas area as the Haida have. In fact, participants noted that the primary interests of each organization vary at their roots, each valuing ecology, culture and economics slightly differently. Notwithstanding, the Gwaii Haanas Agreement has fostered connections between members of all three organizations which can influence the way in which these members process differing perspectives and values. For example, the history of Gwaii Haanas and the stories that have been passed down for generations are known largely as a result of the Haida. The ability for non-Haida (some Parks and DFO members in this case) to understand the context in which Gwaii Haanas came to be and why it remains significant today plays a crucial role in informing the decision-making process. These sort of connections, or bridging ties, are critical to this network and the more abundant they are, the more beneficial the agreement can be to all parties involved.

Bonding ties, on the other hand, are theorized to arise out of strong connections and form almost exclusively among family members and close friends (Granovetter, 1973; Szreter and Woolcock, 2004). Interestingly, three quarters of the connections analyzed in this research were classified as 'strong' (Appendix C & D). While it is undoubtedly true that strong bonding

ties do exist because of the tightknit community found on Haida Gwaii, it is also important to consider that participants were asked to consider their relationship with a contact only on a professional basis. In response, many participants noted that it was difficult for them to differentiate between professional relations and informal relations outside of the work place with some of their contacts. Given the case of Haida Gwaii, where the community component is so strong, it becomes believable that the results so strongly reflect that the Gwaii Haanas network is comprised predominantly of strong connections. From a structural perspective, the horizontal nature of this co-management network permits these connections to grow in the work environment, as collaborative efforts are at the forefront of many professional relationships. Further, it is the community that encourages these connections to grow outside of the work environment, which is a central component that cannot be mandated or expected when entering a co-management agreement, but perhaps the key ingredient to the Gwaii Haanas success and perseverance.

The other quarter of the connections that were classified as either 'weak' or 'medium' in strength can be attributed to various factors, but the experience during my research indicated that they may also be a result of employee turnover (Shaw et al., 2005). Employees shift positions, change organizations and move locations throughout their careers. These shifts inevitably occurred during the short duration of this projects data collection period (Dec 2016-March 2017). The trust that was seemingly embedded in the networks weak connections may be a result of this employee turnover, and the notion that in a work environment, especially when the stakes are high, co-workers must fully trust one another in order to effectively complete collaborative tasks. Veteran staff may not always have the time to allow real trust to develop in new employees prior to passing off important information and seeking critical input for various files or projects. Therefore, the high levels of reported trust in this network may be rooted in necessity, where all connections warrant high levels of trust, regardless of tie strength. The high level of trust may also be a result of collaboration, which is constantly occurring in this community, as trust is most easily built through this type of work (Padley, 2013). This network is relatively fortunate to have the average length of time spent working with Gwaii Haanas be 10 years, and the average time spent in each participant's current position be 7 years. This means that some ties have indeed developed a natural trust over years

of collaboration and others have built trust based on necessity, both of which contribute strength to the overall network.

The duration of the data collection process spanned 4-5 months, in which time several members of the CoP transitioned to different positions or different organizations all together. Although this was challenging, employee turnover can be expected within any social network. In general, the departure of a member of the CoP network can mean losing ties that may have been extremely valuable for the broader network as well as the unique knowledge base belonging to that person. Losing a member of the CoP can also create space for opportunity and growth, where a new member can create different ties and contribute ideas that were previously absent. In the case of this research, a significant transition occurred in DFO. One of DFO's employees who was heavily involved in Gwaii Haanas management and the AMB had just transitioned to a different position as this research kicked off, leaving the role of a 'liaison' between myself and DFO employees empty for 2 months while this research was ongoing. As a result, I lacked communication as well as knowledge and understanding of DFO's organizational structure and involvement, making it more challenging to understand another individual's role in the co-management network. For these reasons, along with others, DFO is underrepresented in the research.

The weaker and less abundant ties in the network occur most prominently between DFO and CHN. Weaker ties, as mentioned, are often a facilitator to create both linking and bridging ties, therefore, the potential is greater for a CHN or DFO employee to create a tie that may help cultivate unique ideas and develop new knowledge through a member from another organization. It can be argued that these perhaps undeveloped ties between CHN and DFO is where potential for a lot of growth within the Gwaii Haanas management network lies.

CHN and DFO networks are currently only connected to each other, for the most part, through Parks. Thus, from a broader perspective, there appears to be some hierarchy when considering which organization is imperative for the functioning of the network. In this case, when Parks is removed from the equation and only CHN and DFO remain, the majority of the actors are left with limited connections or in complete isolation (Figure 13). When isolated, Parks has the strongest independent network followed by CHN, then DFO. When consolidating organization to organization networks, the CHN/Parks network proves to have the highest density, meaning the most there are more connections between CHN and Parks

then there are between CHN and DFO as well as between Parks and DFO. The density of the CHN/Parks network also makes it the strongest, from a theoretical standpoint, in terms of community cohesion, social support and ease of information transfer (Kadushin, 2012). This is not to say that these characteristics do not also exist among the other consolidated organization to organization networks (DFO/Parks, DFO/CHN), but that they are likely the most prominent between CHN and Parks. All social network maps discussed here can be viewed in Appendix J.

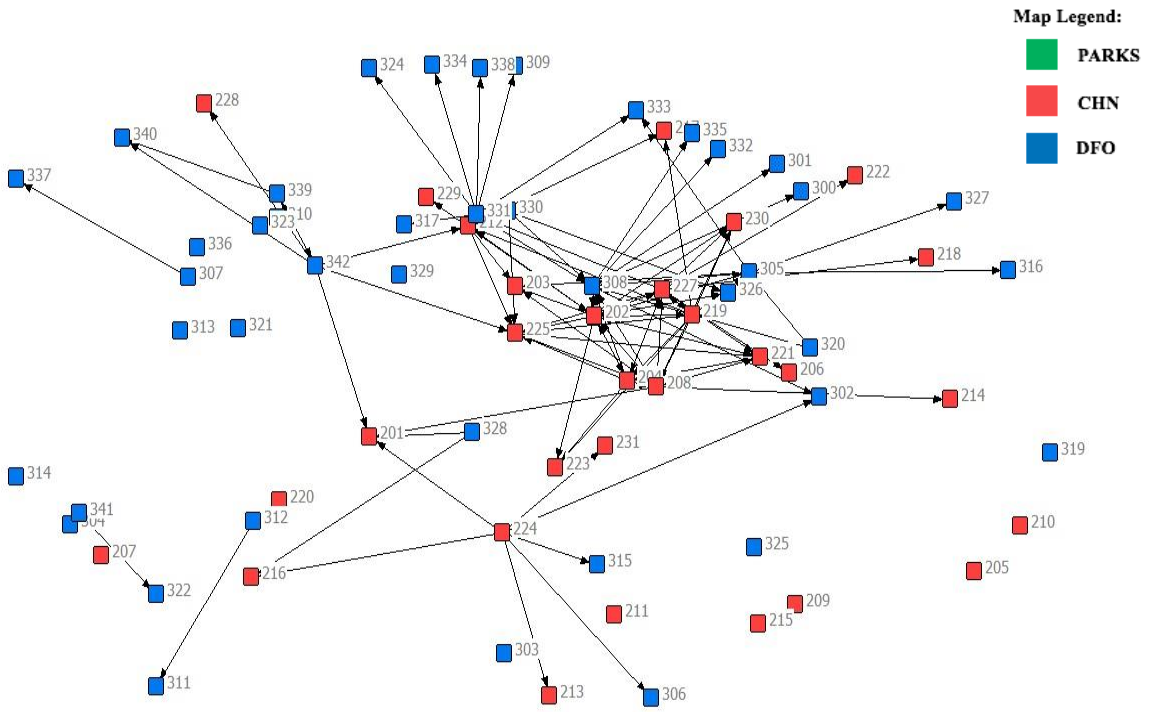

Figure 13: Isolated DFO and CHN social network

5.2 Strength of tie and frequency of communication

The primary reason for the questionnaire was to gather the necessary information to create these social networks, and then characterize each relationship further by asking each participant to answer four questions regarding their relationship with each contact he or she listed. The results for the questionnaire in its entirety are shown in Appendix C and D. The response to Question 1 indicated that just over half of the CoP (62%) interact frequently with their given contact and the remaining portion selected either of the lesser options, regularly or

rarely. It is important to note that in this question, communicating rarely was defined as twice per year or less. Selecting 'rarely', according to Granovetter's theory on the strength of a tie correlating with frequency of communication, likely indicates a weak tie. Our results are not indicative of this hypothesis, as the vast majority (75%) indicated they sustain strong ties with a large portion of their contacts even though they may not communicate that often. Participants often noted that thjey would trust an individual until given a reason not to, or, have no other choice but to fully trust another individual, given their professional partnership. While Granovetter argues that more frequent interactions result in stronger relationships, the comments made by participants suggest that trust is the default behaviour in this network. So, while personal relationships allow trust to become strong over time, it may be that professional relationships in the context of co-management develop trust out of necessity as opposed to over time.

The last question, question 4 on the questionnaire, pertains to the primary reason for the two given individuals to be interacting. The results indicated that both 'close colleague' and 'ad-hoc/as necessary' where the top choices, with 'special circumstance' being the least selected. The organization to organization results show that Parks has the most 'close colleague' relationships with CHN and DFO and the relationships between DFO and CHN register more prominently under the 'as necessary' category. It can be expected that members belonging to the same organization based out of the same office will have the highest amount of 'close colleague' relationships, as was shown in the homophily results, however, it is interesting to note that these 'close colleague' relationships also prominently exist with co-workers outside of one's home organization. With 'close colleague' being defined as a person you work with as a regular feature of day-to-day responsibilities, trans-organization relationships outside of one's own organization would require much more effort to build than those within an organization, where conversation can occur in more unstructured circumstances. While this measurement does not stem from any theory in particular, it will be a useful measurement should this questionnaire be repeated into the future. Perhaps what is currently classified as an 'as necessary' or 'special circumstance' relationship may grow into a close colleague relationship as special projects or reporting processes evolve to encourage more collaboration.

5.3 Organizational relations

According to those who participated in the community well-being interviews, Parks Canada representatives perceive themselves and the CHN to have common interests when it comes to the way they approach the co-management agreement, and vice versa, where both organizations are "highly committed", according to a participant, and believe in and support the way things are happening. On the other hand, Parks and DFO have slightly different agendas, according to those interviewed, where Parks prioritizes ecological and cultural integrity while DFO has the interests of the commercial industry as their priority. Parks has made it a priority to staff local Haida in their office, and as of 2017, approximately 50% of the Gwaii Haanas Parks staff are local Haida people, including the Park Superintendent. CHN has been able to strengthen their relationship with Parks through their many Haida staff. With Parks having Haida employed, it oftentimes eliminates the trust building stage of a relationship that could take years to build with someone else. This undoubtedly increases the understanding of Haida culture throughout the Parks office, perhaps contributing to a stronger relationship between the two organizations.

The strong partnership between Parks and CHN does have some caveats, as people identified areas of contention that have surfaced over the years. The two organizations may be close in proximity, but this does not always result in effective or efficient communication. As noted earlier, communication was among the lowest dimensions of community well-being rated in this community of practice and this is apparent in the Parks-CHN community. Some Parks employees reported, for example, hearing work-related news through the 'grapevine' rather than from their counterparts at other organizations. Another participant mentioned that it is not necessarily clear what the CHN AMB members share with their own organization. So, while communication channels between the organizations are open, they may not be efficient. All three CHN community well-being participants acknowledged this difficulty to communicate as a shortcoming on their part, and something that is not quite at 100% yet, but is being worked on. One participant went on to say that CHN has room to put more effort and perspective forward than they currently are with Parks with an understanding that there is space to be more collaborative on all fronts.

Additional areas of contention in the Gwaii Haanas network revolve around financial support and unreciprocated relationships. Finances play a pivotal role in supporting Gwaii Haanas initiatives. However, it was noted by some that the primary source of funding for these initiatives comes from Parks. So, while CHN and DFO are given equal positioning in the decision-making process, it is commonly Parks responsibility to fund the actions that are to be implemented. However, Parks financial capacity does not place their organization's priorities or preferences above what the other two organizations desire. In fact, the cultural significance that Gwaii Haanas has for the Haida often gives the CHN the upper hand in what the priorities for Gwaii Haanas are. CHN's tolerance for Park's participation in Gwaii Haanas is somewhat less than what is reciprocated. This is evident not only in the results of this research, but also as you become familiar with the Island: one participant noted, for example, that where ever there is a Parks flag hung anywhere on Haida Gwaii, there is a CHN flag hung with it. By comparison, where ever CHN hangs a flag of their own, a Parks one is not raised with it. Another participant noted that the Parks mandate suggests that they collaborate and work for and with CHN as much as possible whereas the CHN mandate is different, so "the reciprocity is not always there". This feeling of unreciprocated solidarity is evident in the SNA results, as only about one in every four relationships are actually reciprocated between the two organizations. Unreciprocated relationships in a network not only decrease the networks stability, but also can be interpreted as an indicator of weak relationships overall (Granovetter, 1973).

One of the major social issues that motivated the creation of the Gwaii Haanas Agreement, the unsettled nature of aboriginal title and Crown claims to Haida Gwaii, is an issue that the CHN continue to seek to address. One of CHN's mandates is to "strive for full independence, sovereignty and self-sufficiency of the Haida Nation" (Council of the Haida Nation, Mandate, 2017). CHN's president referred to Gwaii Haanas as "not being an interim place", and stated that the CHN and the Haida are "walking down a road of reconciliation with the Crown". This is a situation where it appears that the Haida have a clear vision of where they are trying to go in regard to Gwaii Haanas, and there seems to be a general consensus that there is enough trust present (on the CHN's side) to work on these issues together with Parks moving forward.

In terms of DFO's role in the co-management community, their contribution is perceived as weak by participants from CHN and Parks. Recalling the community well-being framework, communion and communication are the two dimensions of community where DFO's contribution to the network is apparently lacking. Communion is lacking mostly due to the agency's perceived absence in the community, and communication is lacking partly due to the perception by their CHN and Parks counterparts that their participation is inauthentic. For example, several interviewees contended that at times it is difficult to understand the motivations and rationale behind DFO's decisions; explained one participant, "the communication is not authentic because it comes from a faceless, nameless decision-making process", another stated that "DFO is hard to [assess] because there is only communication with them as an organization, not on an individual basis, so there are no lasting or long-term relationships, really". Gwaii Haanas members typically only deal with DFO's AMB member who arrives at the table with feedback and input gathered, making it hard for outsiders to understand the source of the information. Participants noted being frustrated by 'bureaucratic tendencies' of DFO contacts; yet, there also appears to be an understanding by CHN employees that the DFO members involved in the Gwaii Haanas agreement are trying their best within the constraints of their organization. The low frequency of interactions among people from all three organizations clearly limits the relationships that form, at least beyond those among AMB members. This, according to a DFO member, can be largely attributed to the rigidity of the DFO culture, and a general reluctance to get involved. It is only recent that the DFO has had representation on the AMB, and this position recently changed, further supporting our observation that turnover is an important vulnerability for this co-management community.

Despite these challenges, participants from CHN and Parks did note one important area of strength for DFO's contributions to the community: many people singled out DFO's tendency to listen to unfamiliar perspectives and opinions as perhaps their strongest contribution. Their peers feel that DFO is optimistic about their future in the co-management network, indicating that their recent transition incorporating them into the Gwaii Haanas Agreement has set a new precedent for the organization. DFO's continued effort to increase their contribution to the community of practice is not received without question. It was brought up that DFO appears to be uninterested in being involved with Gwaii Haanas from a co-

management perspective. One participant noted the attitudes of DFO are along the lines of "I am only here because I am technically not able to make this decision on my own anymore". The DFO members who participated in this research are inherently aware of their standing within the community and have a desire to improve and work on these evolving relationships.

It is worth noting that the assessment of DFO by CHN and Parks participants is not necessarily telling a comprehensive story. My data suggests a divide amongst those located locally and those whom are not. There is a group of DFO employees that have been based out of the Haida Gwaii office for over a decade, some have even grown up on the island. These individuals have developed an understanding of the culture that only time can provide and, as a result, are invested in, and are a part of the core community. On the other hand, there is a group of DFO employees that come and go, leaving the island when their contract no longer required to stay there. According to some interviewees, there may be the perception of a revolving door, consisting of individuals who are less invested in the community and do not have time to develop an understanding of the Haida culture. Additionally, there are many DFO members who are involved in Gwaii Haanas but are based out of Vancouver, Prince Rupert, and a handful of other cities across B.C and the country. These individuals may rarely, if ever, visit Haida Gwaii or Gwaii Haanas, which is perhaps the reason behind the low communion rating the organization received from Parks and CHN peers, and also why DFO is on the peripheral of the community of practice. Again, this creates a divide between two different "types" of DFO members, which ultimately made it difficult for participants to assess the organization on the same scale. This finding is consistent with one highlighted in Berkes (2009) by Kruse et al. (1998) where it was found that the key factor in co-operation involving joint management boards is frequent presence in the community.

Similarly, Parks employees often noted that the relationships with DFO employees are most likely absent due to the small presence they have on the islands of Haida Gwaii. Parks and DFO employees alike find it difficult to establish and maintain relationships with one another due to the distance between offices. This also hinders communication, in some cases disrupting the flow of communication between those on the island and those located elsewhere. "The people Gwaii Haanas Parks works with [from DFO] do not live here", was the reason behind a low communion rating for one participant. With that being said, the handful of DFO

employees on the island are known to be in relatively frequent communication with those Parks employees located in the Gwaii Haanas office, which strengthens the "core" community. Finally, CHN participants in the Gwaii Haanas Network seem to rely more on personal contact as opposed to telephone or email. This, again, makes it so members from other organizations located on the Island are more inclined to communicate with CHN members as opposed to those members located off island. The proximity within which the Gwaii Haanas Parks office and the CHN office are from one another may play a significant role in their tight knit relationship. Not only that, but it is not uncommon that employees from either organization will show up at the same lunch spot, grocery store, or dinner party within the same day, "there is no separation between work and personal lives, really", one participant noted. According to those interviewed, these informal "ad hoc" interactions are stronger and contribute more to the community than intentional interactions that occur in the work place. This, I argue, creates a "core" community factor in the Gwaii Haanas network.

5.4 Communion

The results from these community well-being interviews demonstrate that Parks and CHN have a well-established relationship that has grown solid because of time and active efforts from people in both organizations. DFO's relatively late entry into the Gwaii Haanas management network has perhaps put them at a disadvantage, as it will likely take years, perhaps decades, for a comparable amount of trust to build. Of course, the *Haida Nation v. Canada* (DFO) 2015 case has added tension to the cooperative management network, specifically between CHN and DFO. Tensions may have subsided to some extent since the initial 2015 trial, but as recent as this year (2017) the Haida have fought, and won, the battle on closing down the Haida Gwaii herring fishery to commercial fishing. Changes in the dynamic of the relationship between CHN and DFO is sure to play an integral role in the coming years of the Gwaii Haanas Agreement. A fresh face on the AMB from the DFO side has seemed to ignite new hope in the network, specifically from DFO. This change has supposedly resulted in major improvements in communication and increased the 'tolerance' component from a community well-being standpoint. With the collaborative nature of this agreement being a highly valued component to the AMB's newest member, it can be expected that the DFO will

slide into a more supportive and involved role with Gwaii Haanas as new collaborative initiatives pan out.

The strong relationships that do exist in this network are generally developed and reinforced through informal interactions that happen outside of the work environment. Haida Gwaii is a small place with a small population; people get to know one another, or are forced to get to know one another, through one avenue or another. This fact became increasingly apparent through the interviews, where many participants had a difficult time deciphering between who they work with collaboratively or which co-workers they are close with outside of work. When trust builds naturally outside of a work environment, it seems inevitable that it will translate into being present in working relationships, and that these individuals with established relationships outside of the office will collaborate frequently and effectively on professional tasks, given the understanding and kinship that already exists.

Participants often noted that they felt pressure to maintain these good working relationships, specifically with others located on the Island, given the likelihood of running into them outside of the office. It is important to the community for these relationships to remain positive in order to ensure that both the core co-management community of Gwaii Haanas and the community of Haida Gwaii function as healthy and well as possible. One respondent discussed how a stressful meeting with disagreements and different opinions can result in a heated, and sometimes inconclusive, discussion. However, the individuals with whom you disagreed with earlier could be behind you in line at the local grocery store that evening. It is in these circumstances where the differences in opinion are forced to be overlooked and real relationships develop. This is where the co-management community becomes more than just a community of practice, but rather a united community in and of itself.

It is this quality of community that Gwaii Haanas CoP embodies that, I argue, is important for effective co-management. I analyzed the Gwaii Haanas Agreement using the same parameters as the community well-being heat diagram model to determine which of the five dimensions of well-being are actually mandated in the 1993 Agreement. Examples of distributive justice, open communication, tolerance, and collective action are all addressed in the document that binds the Government of Canada and the Council of the Haida Nation to the cooperative management of Gwaii Haanas (Table 3). The missing element, communion, was

not clearly mandated in the document, however, given what has been discussed thus far and the findings from the interviews that took place with individuals involved in the management of Gwaii Haanas, it seems that communion is indeed present, at least to some extent, amongst the co-management community. Wilkinson suggests that the other four criteria (distributive justice, open communication, tolerance and collective action) are all encouraged if the communion component is present, stating that communion is ultimately the conclusion to social well-being (Wilkinson, 1991).

It is not surprising, however, that the communion dimension of community well-being is not evident in the text of the Gwaii Haanas Agreement. I have identified it here as intentional interaction and relationship building within and outside of a professional setting (adapted from Wilkinson, 1991), and this characteristic of well-being is difficult to analyze. The question becomes whether it is possible to mandate that people in the co-management network sustain healthy relationships with one another; while text in documents such as agreements, mandates and management plans can allude to this, it is almost impossible to enforce or monitor. The other four criteria in the Wilkinson framework can be effectively incorporated into binding documents and it is relatively simple to detect whether or not these characteristics are present. This communion component is more difficult to assess. It can perhaps only be detected through observing the co-management network in action or gaining different perspectives through discussion with different individuals involved. This research employed both methods to some extent.

5.5 Participation

This research was primarily designed in consultation with Parks and the members of the AMB. While DFO and CHN representatives could provide feedback and comments that were undeniably valuable to the process, their role in the design was secondary. Likewise, Parks employees were strongly encouraged to participate from management within their own organization. As such, it is not surprising that the participation rate from Parks employees was significantly higher than the other two partnering organizations. Further, most Parks staff that have any involvement in Gwaii Haanas management are located in the Queen Charlotte office, which is the main hub community on Haida Gwaii. This made communication efforts more

straightforward, allowing essentially all interviews with Parks personnel to take place in one building, in person, and in the span of a week. All employees that are based out of the Queen Charlotte Parks office work in some capacity on Gwaii Haanas management, including all 27 Parks individuals that participated in this research.

By comparison, many CHN and DFO employees do not have job descriptions that include items relating to Gwaii Haanas management. If they do, then it is only a fraction of an employee's responsibility. Therefore, self-identifying as being involved in Gwaii Haanas management, directly or indirectly, was less straightforward for these individuals as opposed to the Gwaii Haanas Parks employees. Whether individuals perceive their work as being Gwaii Haanas-related likely complicated, and perhaps even reduced the response rates from both CHN and DFO.

Additional challenges regarding participation rates revolved around communication. As noted previously, CHN employees seemingly have a preference to communicate in person, which was obviously difficult to do remotely. This made it challenging to discuss the research and set up interview times with potential participants which may have led to decreased response rates from CHN. Regarding DFO, the largest obstacle was how spread out and seemingly disconnected the organization is. With its members located across different cities in Canada, communication, including interviews, was restricted to email and phone, ultimately making it difficult to establish my presence within the large organization.

6 CONCLUSIONS

The various results discussed here show that collaboration within the Gwaii Haanas CoP is indeed occurring; however, there are many connections missing that could strengthen the network. With communication being one of the community well-being dimensions that may require some strengthening in the CoP, increased connections among participants will play a large role in producing higher levels of collaboration and improving the knowledge sharing in the network. Currently, Parks is playing an integral role in connecting the Gwaii Haanas network, largely being the 'middle man' between CHN and DFO connections. This is likely because of the Parks staff in Haida Gwaii having an intense focus on managing Gwaii Haanas, as it is the offices main initiative. Thus, the internal structure of Parks is highly catered to collaboration and encouraging their employees to establish solid working connections with others in the CoP. This characteristic of Parks, and the support this structure receives from its own organization, is perhaps what allows this co-management agreement to work as effectively as it does. On the contrary, Gwaii Haanas is only a small focus of CHN's and DFO's initiatives, so it may be that the internal structures of these organizations do not provide the same support for collaboration as the Gwaii Haanas Parks office. Nonetheless, collaboration is occurring, so perhaps it is the case that co-management works most effectively when at least one organization involved in the agreement exists only to work on the collaborative initiatives put forward by the co-management agreement, as the Gwaii Haanas Parks branch does. This way, one organization can provide the co-management network with enough momentum to encourage and solidify the ongoing participation from other collaborative partners.

While Parks may play the "middle man" role, this research also demonstrates how critical the CHN is to the success of this agreement. The challenges surrounding the legalities of co-management often require a well-established local organization, a role in which CHN has been able to take on in the Gwaii Haanas Agreement. The CHN have held their own in the Supreme Court of Canada but have also mended and willingly entered relationships with the members from the organization they met there. While the CHN's ties with DFO are inevitably the weakest of the triad, there are current holes within the network structure where the development of these relationships can, and hopefully will, fill voids that can create bridges to

a stronger and an increasingly diverse network. The political conflict that is ongoing behind this co-management agreement may not ever fully subside, potentially indicating that conflict does not necessarily have to go away or become resolved in the presence of co-management. The aspiration to 'get co-management right' may mean that conflict can serve as a type of motivation for those involved. That being said, the relationship between the Government of Canada (DFO specifically) and the Council of the Haida Nation is arguably where the most vulnerability lies for future conflict as the ongoing political debate regarding the areas fisheries stock is still prevalent. Fostering the relationships amongst these two organizations will likely have it challenges, and it may be beneficial to use intentional social networking as a tool to plant seeds for the future growth of authentic connections in this network.

Another key finding presented in the results is the horizontal structure that the social network analysis found this network takes on. I would argue that a horizontal structure suggests that collaboration is occurring amongst the network at all levels, regardless of hierarchical structures in each organizational network. It is not only allowing, but also encouraging employees of all organizations and of any hierarchical position to collaborate with others from partnering organizations. In this way, social capital amongst the network expands exponentially as new linking and bridging ties form, ultimately permitting those in collaborative relationships to bring about new ideas that can improve how Gwaii Haanas is managed. These horizontal relationships may also increase the level of equity, a weak element of the CoP, present in the network as power is dispersed to all network positions. The community well-being dimensions that are strong in this network (communion, collective action and tolerance) are all likely strengthened and encouraged by this inherent horizontal structure that Gwaii Haanas co-management embodies. It is to be expected, then, that as more collaborative connections are formed, they will contribute to the community's well-being and strength of this structure as it grows. In this way, I would argue, too, that a horizontal social network structure is pivotal in fostering the continued success that the Gwaii Haanas CoP experiences.

Communities attempting to replicate or are working to resemble the same type of co-management seen in Gwaii Haanas may find it challenging as Gwaii Haanas is unique for a few reasons. It is a highly regarded tourist destination, however, the location of Gwaii Haanas makes it difficult and costly to get to. It is inaccessible by vehicle, and only small boats, float

planes and kayaks are warmly accepted by the Haida Gwaii Watchmen. For this reason, tourists do not necessarily 'stumble' across Gwaii Haanas, but rather it is a sought-after destination that takes planning and finances to get to. For example, in the 2016-17 season, Gwaii Haanas experienced 2,819 visitors whereas Northern Saskatchewan's Prince Albert National Park saw 249,310 visitors in that same season (Parks Canada, 2017). Further, visitors must partake and pay for a mandatory orientation put on by Parks prior to being granted permission to experience Gwaii Haanas. As a result of this, and the Watchmen that protect the area during the warmer months, Gwaii Haanas remains well protected and the stress of having reckless or careless tourists who may compromise the integrity of the Park is minimized. Additionally, Gwaii Haanas is relatively well funded and staffed given its annual visitation rates. This abundance of support from the federal government likely plays a role in Gwaii Haanas management. Other factors such as isolation from the mainland and the small population size of those located on Haida Gwaii may play an integral role in the longevity of the co-management agreement.

Additionally, my results show that the co-management network for Gwaii Haanas is complicated, geographically dispersed, and constantly evolving. Employees from all organizations shift roles and move in and out of organizations. My data suggests the employees who are around long enough, and have the desire to integrate themselves into the Haida Gwaii community, are able to make the connections that fuel this co-management agreement. All three organizations experience different rates of employee turnover on the island, however, minimizing this turnover may be a key factor in strengthening the CoP in order to allow time for relationship building. Members of the CoP are based out of towns and cities all over the country, posing other challenges for building a fully connected CoP. The network is most connected when only the members based out of Haida Gwaii are considered. This is where the standards for community and communion are met, and often exceeded beyond any expectation any legal document can precedent. The members on Haida Gwaii experience the Gwaii Haanas CoP at its optimum, where the individuals involved seem to value one another over politics. Perhaps, then, it is this aspect of communion that the that makes this co-management agreement work better than arguably anywhere else.

The community of Gwaii Haanas management has also proven that perseverance is invaluable to making successful co-management possible. Gwaii Haanas is a case where

almost 25 years have passed since the initial agreement was set in place and there have been many instances where it would have been easier for the organizations to abandon co-management rather than face the obstacles that have challenged, and will continue to challenge them. While my study was constrained to two years, it is clear that there is deep rooted relationships within the community that span far beyond what I could have documented in this time frame. It is certainly not easy to bring together three separate organizations that are all based on different belief and value systems and expect consensus based decisions to be plausible. Over and above political constraints, the Gwaii Haanas community of practice has created a pathway to successful co-management that is seemingly grounded in good relationships and a strong community. Gwaii Haanas management proves as an informative example to others across the country and the world to show that when the people involved are truly willing to allow it, irrespective of any politically binding document, local knowledge can, and will, work alongside science to understand and manage natural resources.

6.1 Future work

The methods utilized here can be transposed and used as a measuring tool to assess not only Gwaii Haanas throughout the coming years, but also to assess different co-management agreements across Canada and perhaps the World. It would be interesting to see this happen on the east coast of Canada where there is a co-management agreement in place to manage Polar Bears in Newfoundland and Labrador, or perhaps the fisheries co-management cases described by Alexander, Armitage & Charles (2015) in the Jamaican marine reserves, or one of the more long-standing co-management agreements which occur in Norway or Japan, as discussed in Pomeroy and Berkes (1997). The questionnaire holds replicable qualities that can be useful in obtaining and assessing social networks for communities of practice. Gathering data on who is collaborating with who and the characteristics of those ties help assess the extent to which collaboration is occurring between and among the involved organizations. Wilkinson's framework for well-being can also be translated to determine the extent in which a community of practice is experiencing the qualities of well-being within the network, or, at the very least, prompt a dialogue on areas where the well-being is not being satisfied. Learning from other cases could be a way to pick up on new dimensions or characteristics that the Gwaii Haanas

community is missing, but that other co-management communities possess. Either way, lessons for co-management can be learned by comparing two co-management communities using the methods from this research.

It is worth noting that there was an important component left out of this study. There is a significant history behind each individual relationship as well as the relationships between organizations that was not necessarily expanded upon in this research. The goal of the partners was to only discuss the state of the network over the last two years, but it is likely that the history of these relationships influences the community of practice and the results seen here. Community events such as totem pole raisings, which are large affairs that often engage people from across communities, are one example of an event that has lasting impact on network connections. It would be an interesting process for a study to dig deeper into the relationships than I have, discovering how exactly they came to be and discussing some of the key ties that have been mended and broken throughout the years. Looking back in time could create some sort of a document that this current benchmark research could be compared to.

Another component that was intentionally omitted in this research is the assessment of the ecological well-being of Gwaii Haanas. This research looked almost explicitly at the social dimensions behind managing the area, and did not consider how, and if the ecological components of Gwaii Haanas are being successfully managed under this agreement. Environmental stresses such as logging and invasive species have played a significant role in what Gwaii Haanas looks like today. It would be a worthwhile endeavor to explore this aspect, and attempt to determine if the members of the CoP are happy with how the ecological aspects of Gwaii Haanas are being managed.

In the years to come, it is my hope that Gwaii Haanas members will re-administer this research to assess progression or regression of the social network. It is my expectation that more ties will be made throughout the network, linking people that were previously unlinked and creating bridges between individuals to encourage different ways of knowing, ultimately improving the success of the community. The results will perhaps become more useful when the research is replicated, where new connections and collaboration efforts can be detected and used to assess progress towards meeting co-management targets and goals.

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8 APPENDIX

APPENDIX A: Questionnaire

Date: Time:

Name:

Gender: M / F

Age Range: **(1)** 15 – 24 **(2)** 25 – 34 **(3)** 35 – 44 **(4)** 45 – 54 **(5)** 55 – 64 **(6)** 65+

Position title:

How long have you been in your current position?

How long have you been involved with Gwaii Haanas Management?

Preliminary Questionnaire

Research shows that success of collaborative and cooperative management depends greatly on the people involved, the quality of their relationships, and the local governing communities' ability to achieve empowerment. This questionnaire will provide baseline data regarding how cooperation is happening in the management of Gwaii Haanas.

There are only four questions. They should be answered using the worksheet found at the end of this document.

In regards to managing Gwaii Haanas, please begin by indicating on the worksheet three to five people **within your own organization** followed by three to five people **outside of your own organization** (Parks/DFO/CHN) that you consider to be most important to you in effectively doing your job. Please note that these people are not necessarily the individuals you interact with on a regular basis, but rather those you work with that are imperative to your ability to complete professional tasks. If more than five people meet these criteria, please feel free to add more than five names. Then, for each, please select the most suitable answer for the following questions by indicating the numerical response (1, 2 or 3) in the respective square on the work sheet.

Note: when the results of this research are reported, names will be replaced by numeric identifiers to ensure confidentiality.

Question 1: Frequency of interactions

How frequent are your professional interactions with this individual?

1= Rarely: I interact with this person twice a year or less.

2= Regularly: I interact with this person more than twice a year but less than once a month

3= Frequently: I interact with this person once a month or more.

Question 2: Mode of interaction

There are different ways for people to interact in a professional setting. Please classify your relationship with each person listed using the three options below. Pick the best fit for characterizing the majority of your interactions with this person.

1= Informative: I generally only work with this person to inform them of what I, or my organization, is doing.

2= Consultative: I generally discuss with this person my plans or my organization's plans and obtain feedback, but I do not rely on this person to help me make decisions.

3= Cooperative: I cooperate with this person through the decision-making process or in the implementation of decisions.

Question 3: Relationship Strength

How would you classify the strength of your relationship with this individual?

1=Weak: There is minimal trust or expectations in this relationship. I am unsure if this person would help me or if I would help this person upon request.

2=Medium: Trust is building or some trust exists. This person may help me or I may help this person upon request.

3= Strong: Trust exists in my relationship with this person. I trust that this person would do their best to assist me if requested to do so and I would do my best to assist this person upon their request.

Question 4: Reasons for interaction
What is the primary reason you interact with this individual?

1=Special Circumstance: There is a specific project that mandates that I work with this person.

2=As Necessary: I work with this person on an as necessary basis, but not as a regular feature of my daily responsibilities

3=Close colleague: I work with this person as a regular feature of my day to day responsibilities.

The End

Thank you for taking the time out of your schedule to fill out this document and provide me with the necessary data for my research. Please send completed questionnaires and any additional comments or questions you may have to hanna.neufeld@usask.ca or Phil.loring@usask.ca

Sincerely,
Hanna Neufeld & Philip Loring

Individuals within your organization

	Name	Organization (DFO/Parks/CHN)	Question 1: Frequency	Question 2: Mode	Question 3: Strength	Question 4: Reason
1						
2						
3						
4						
5						

Individuals outside of your organization

	Name	Organization (DFO/Parks/CHN)	Question 1: Frequency	Question 2: Mode	Question 3: Strength	Question 4: Reason
1						
2						
3						

4						
5						

APPENDIX B: Attribute Data

Gender:

Gender	Number of Participants
Male	21
Female	26

Age Range:

Age Range (years)	Number of participants
15-24	2
25-34	6
35-44	20
45-54	8
55-64	10
65+	0
N/A	1

Years in Position/Gwaii Haanas Management

Years	In position	Involved in Gwaii Haanas
2 years or less	12	12
3-5	12	6
6-10	13	12
11-15	6	6
16-21	4	4
22+	0	7

APPENDIX C: Questionnaire Data (Percentages)

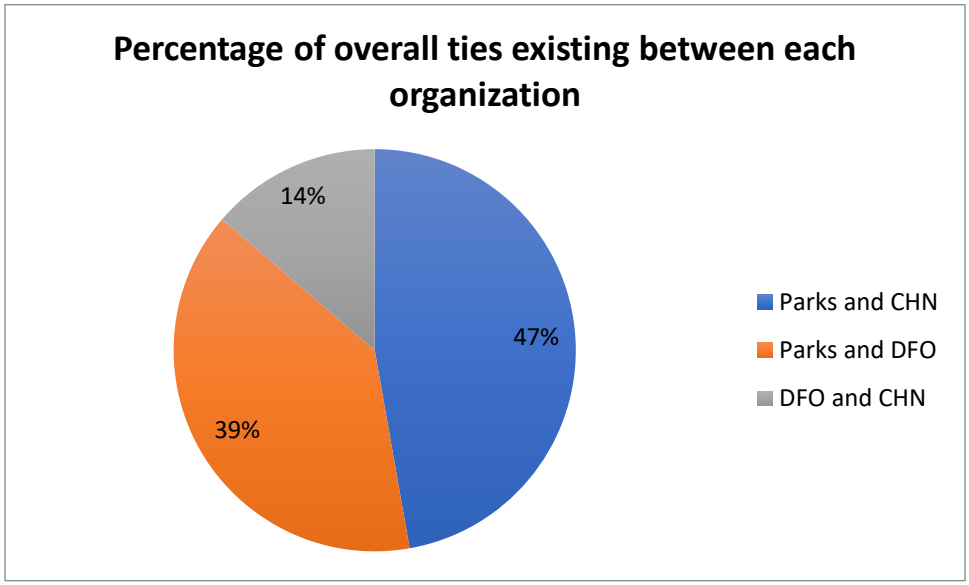


Figure C1: Overall organizational ties. Of all existing ties in the network that connect organizations (that is, not including ties within organizations), the majority are among Parks Canada and the Council of the Haida Nation.

Question 1: Frequency of Interaction

Network	Rarely (1)	Regularly (2)	Frequently (3)
Gwaii Haanas	10	28	62
Parks and CHN	6	25	69
Parks and DFO	7	22	71
DFO and CHN	16	37	47

Question 2: Mode of Interaction

Network	Informative (1)	Consultative (2)	Cooperative (3)
Gwaii Haanas	8	33	59
Parks and CHN	7	33	60
Parks and DFO	6	36	57
DFO and CHN	7	25	68

Question 3: Relationship Strength

Network	Weak (1)	Medium (2)	Strong (3)
Gwaii Haanas	3	22	75
Parks and CHN	2	22	76
Parks and DFO	3	19	78
DFO and CHN	1	23	76

Question 4: Reason for Interaction

Network	Special Circumstance (1)	As Necessary (2)	Close Colleague (3)
Gwaii Haanas	15	45	40
Parks and CHN	11	43	46
Parks and DFO	12	43	45
DFO and CHN	14	49	37

APPENDIX D: Questionnaire Data (Raw/number of ties)

Question 1: Frequency of Interaction

Network	Rarely (1)	Regularly (2)	Frequently (3)
Gwaii Haanas	49	135	300
Parks and CHN	22	90	253
Parks and DFO	22	67	213
DFO and CHN	17	39	50

Question 2: Mode of Interaction

Network	Informative (1)	Consultative (2)	Cooperative (3)
Gwaii Haanas	39	159	286
Parks and CHN	27	119	219
Parks and DFO	19	110	173
DFO and CHN	7	27	72

Question 3: Relationship Strength

Network	Weak (1)	Medium (2)	Strong (3)
Gwaii Haanas	14	106	364
Parks and CHN	7	81	277
Parks and DFO	8	58	236
DFO and CHN	1	24	81

Question 4: Reason for Interaction

Network	Special Circumstance (1)	As Necessary (2)	Close Colleague (3)
Gwaii Haanas	71	220	193
Parks and CHN	39	157	169
Parks and DFO	37	130	135
DFO and CHN	15	52	39

APPENDIX E: Homophily Measurements

Organziation-Organization relations

Attribute	**Result**			
	Overall Network	DFO & Parks	DFO & CHN	Parks & CHN
Gender	0.33	0.33	0.09	0.30
Age	0.67	0.60	0.24	0.65
Organization	-0.28	-0.58	-1.00	-0.50
Years in position	0.85	0.77	0.41	0.85
Years involved with Gwaii Haanas	0.91	0.85	0.39	0.91

Table E1: Homophily results between organizations

Inter-organization relations

Attribute	**Result**			
	Overall Network	Parks Network	CHN Network	DFO Network
Gender	0.33	0.23	-0.10	0.03
Age	0.67	0.54	-0.01	0.03
Organization	-0.28	-1.00	-1.00	-1.00
Years in position	0.85	0.79	0.05	0.10
Years involved with Gwaii Haanas	0.91	0.87	-0.01	0.10

Table E2: Homophily results among organizations

APPENDIX F: Table of Cut Points

#	Organization	Node Label
1	Parks	103
2	Parks	106
3	Parks	130
4	Parks	131
5	Parks	135
6	Parks	136
7	Parks	137
8	Parks	144
9	Parks	147
10	Parks	151
11	Parks	154
12	Parks	155
13	Parks	157
14	CHN	208
15	CHN	224
16	CHN	227
17	DFO	305
18	DFO	307
19	DFO	308
20	DFO	312
21	DFO	331
22	DFO	342

APPENDIX G: Table of Cut Blocks

Block 1: 104 106
Block 2: 106 119
Block 3: 103 108
Block 4: 105 136
Block 5: 113 136
Block 6: 101 155
Block 7: 123 155
Block 8: 126 155
Block 9: 134 155
Block 10: 117 147
Block 11: 128 154
Block 12: 213 224
Block 13: 112 151
Block 14: 218 227
Block 15: 222 227
Block 16: 300 308
Block 17: 301 308
Block 18: 305 316
Block 19: 305 327
Block 20: 308 332
Block 21: 308 335
Block 22: 309 331
Block 23: 324 331
Block 24: 331 334
Block 25: 331 338
Block 26: 224 306
Block 27: 154 304
Block 28: 311 312
Block 29: 144 322 341
Block 30: 228 342
Block 31: 208 214
Block 32: 143 157
Block 33: 155 325
Block 34: 137 205
Block 35: 137 210
Block 36: 137 319
Block 37: 129 135
Block 38: 135 150
Block 39: 307 337
Block 40: 135 307
Block 41: 135 310

Block 42: 135 313
Block 43: 135 318
Block 44: 135 323
Block 45: 135 336
Block 46: 127 136
Block 47: 136 156
Block 48: 136 303
Block 49: 130 209
Block 50: 130 215
Block 51: 103 138
Block 52: 103 152
Block 53: 103 314
Block 54: 102 103 106 107 109 110 114 115 116 118 120 121 122 124 125 130 131 132 133 135 136 137 139 140 141 142 144 145 146 147 148 149 151 153 154 155 157 201 202 203 204 206 207 208 211 212 216 217 219 220 221 223 224 225 227 229 230 231 302 305 308 312 315 317 320 321 326 328 329 330 331 333 339 340 342
Block 55: 111 131
Block 56: 100 131

APPENDIX H: Freeman's Degree Centrality Results

	Node	OutDegree	InDegree
1	135	112	36
2	157	86	51
3	155	64	56
4	136	61	38
5	124	58	37
6	202	51	40
7	130	46	23
8	227	43	17
9	120	43	45
10	110	35	15

Table H1: Freeman's centrality measurements for the 10 most central nodes

DESCRIPTIVE STATISTICS

		1 OutDegree	2 InDegree	3 NrmOutDeg	4 NrmInDeg
1	Mean	9.221	9.221	2.364	2.364
2	Std Dev	17.981	11.347	4.611	2.909
3	Sum	1208.000	1208.000	309.744	309.744
4	Variance	323.317	128.753	21.257	8.465
5	SSQ	53494.000	28006.000	3517.028	1841.289
6	MCSSQ	42354.582	16866.580	2784.654	1108.914
7	Euc Norm	231.288	167.350	59.305	42.910
8	Minimum	0.000	0.000	0.000	0.000
9	Maximum	112.000	56.000	28.718	14.359
10	N of Obs	131.000	131.000	131.000	131.000

Network Centralization (Outdegree) = 26.556%
Network Centralization (Indegree) = 12.087%

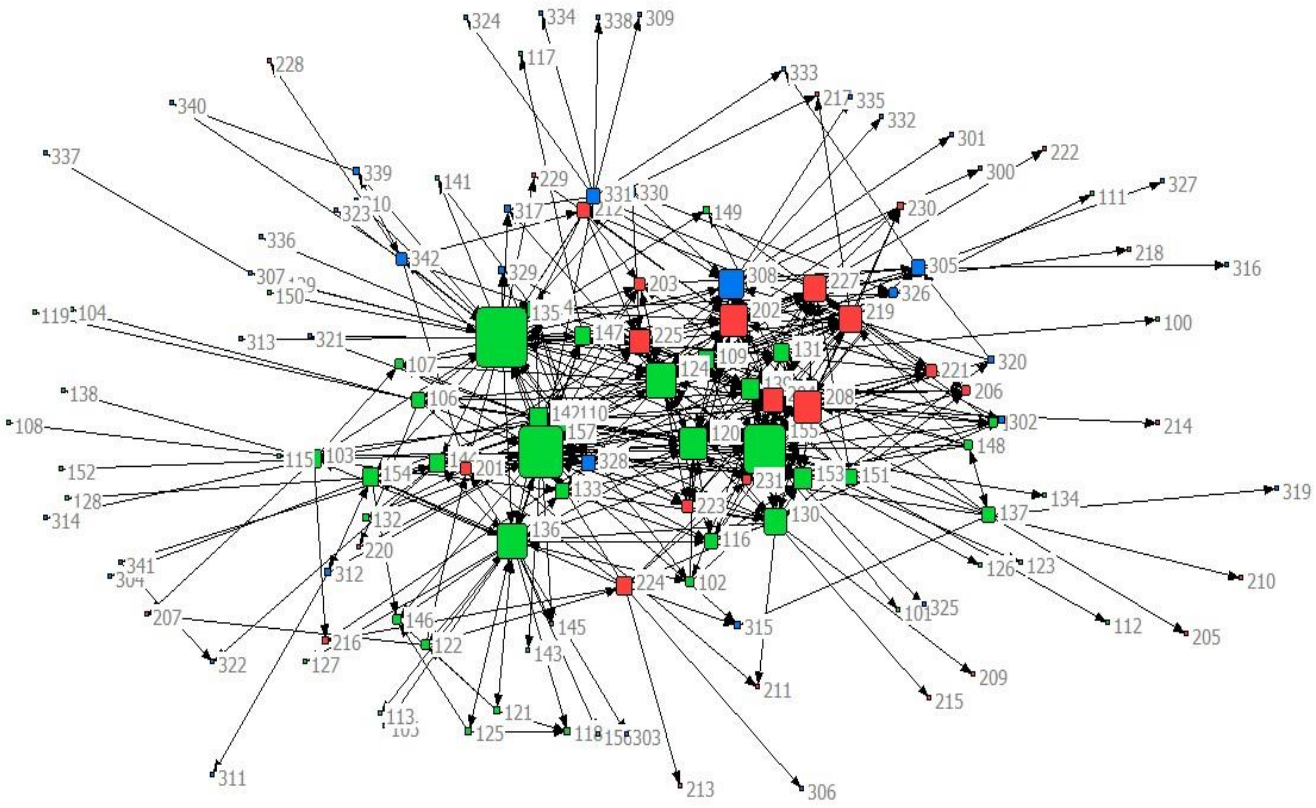


Figure H1: Social network map with the size of the node reflecting degree centrality

APPENDIX I: Betweenness Centrality Results

Measurement	Result		
Betweennes Centrality	Actor	Betweenness	nBetweenness
	135	1678.480	10.009
	157	1330.058	7.931
	136	1005.021	5.993
	155	883.709	5.270
	308	526.109	3.137
	103	398.687	2.377
	202	392.719	2.342
	120	316.871	1.890
	124	300.760	1.793
	144	299.146	1.784
Network Centralization Index	9.63%		
Out-degree centralization	9%		
In-degree centralization	4%		

Table I1: Betweenness centrality measurements for the 10 most central nodes and network centralization

APPENDIX J: Social Network Maps

Legend for all social network maps:

Overall Network

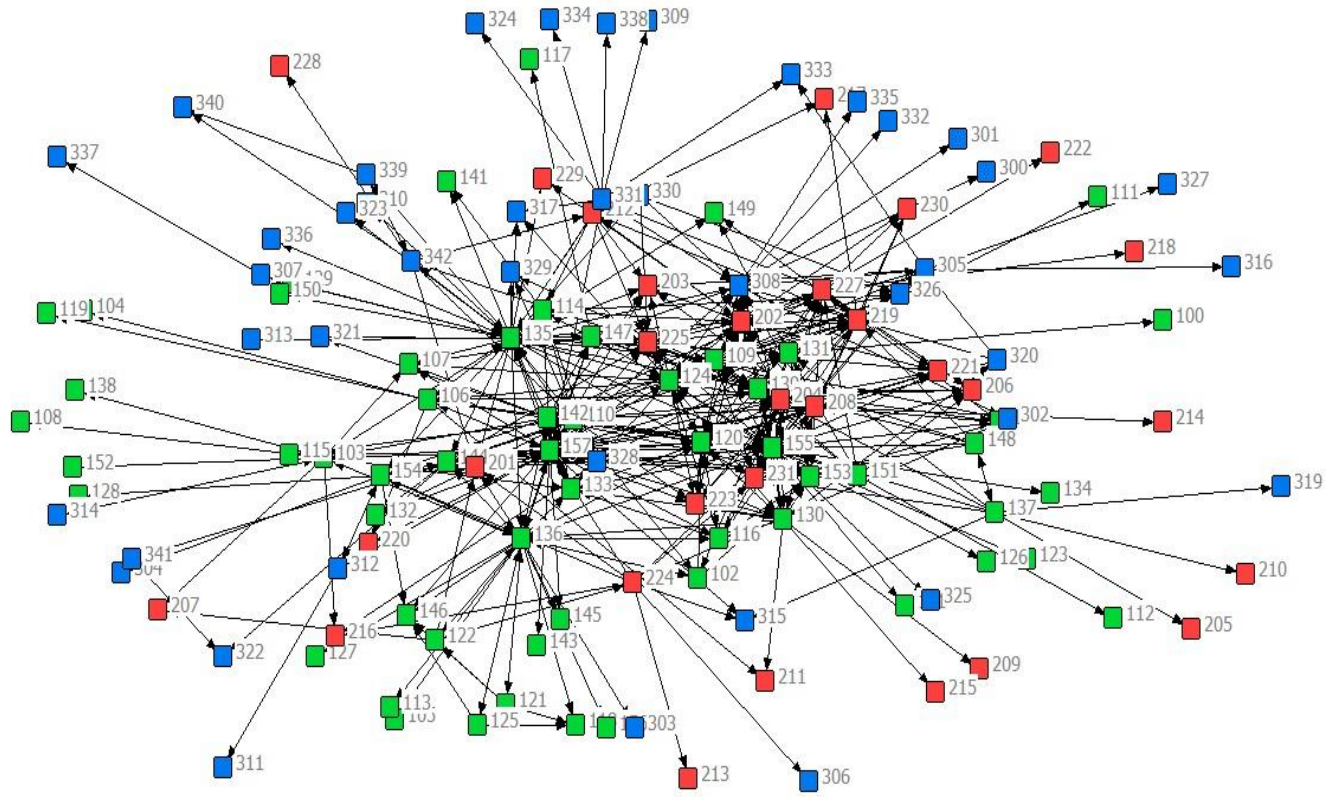


Figure J1: Social Network for Gwaii Haanas co-management

Parks and DFO Network

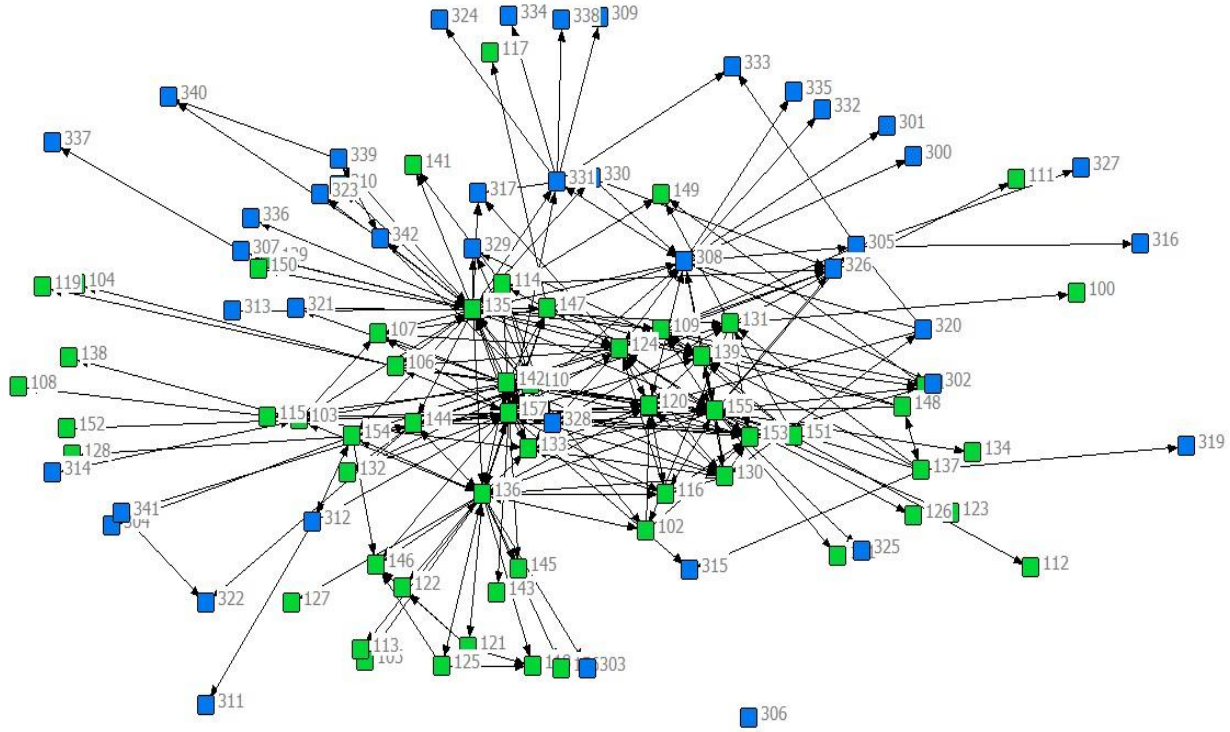


Figure J2: Social network for Parks and DFO

DFO and CHN Network

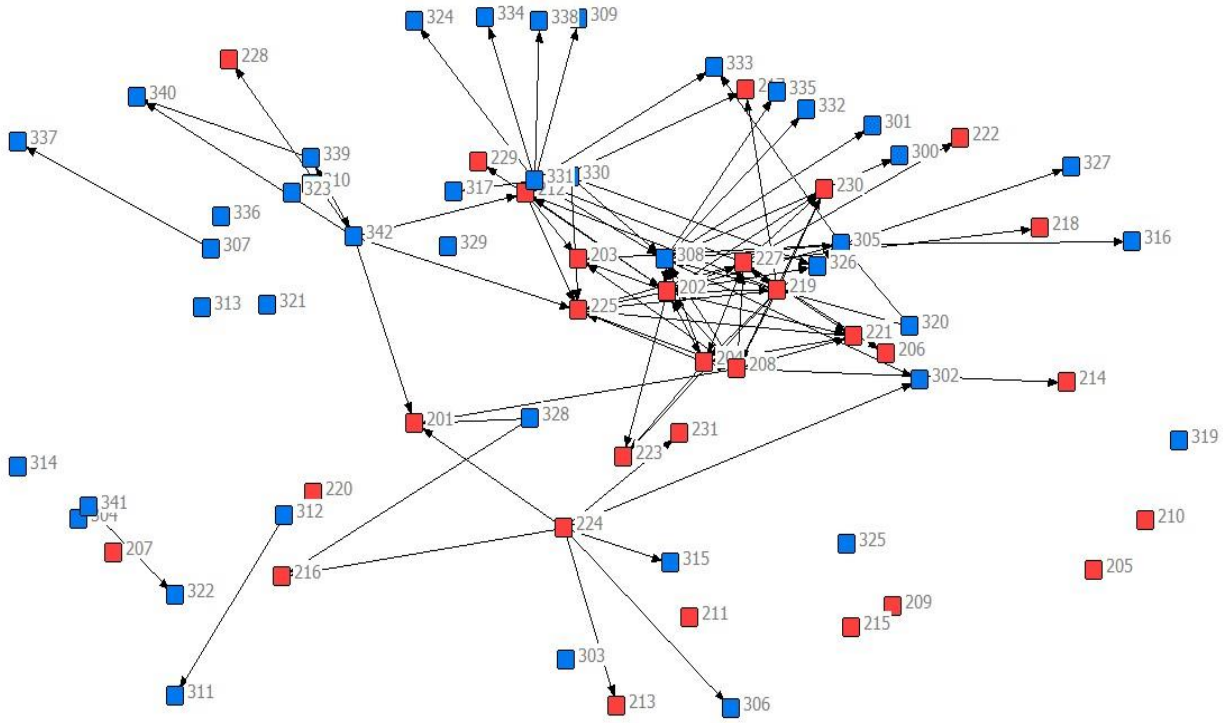


Figure J3: Social network for DFO and CHN

Parks and CHN Network

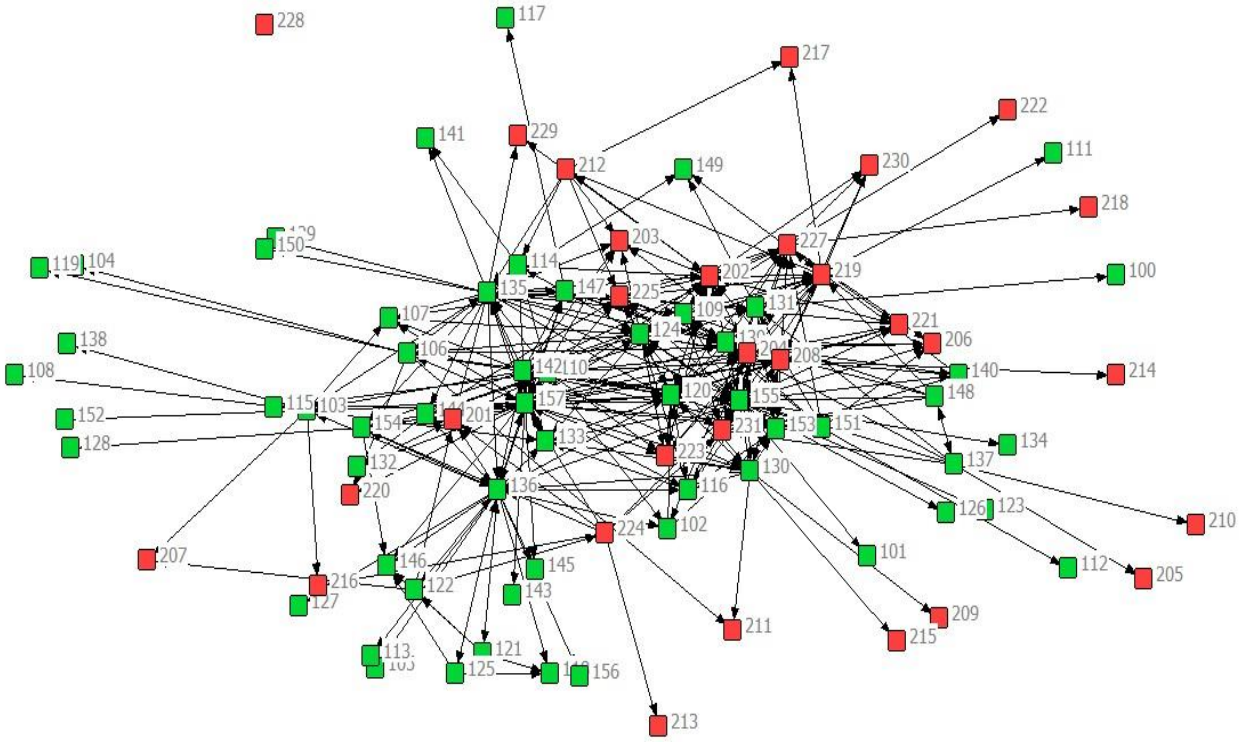


Figure J4: Social network for Parks and CHN

Parks Network

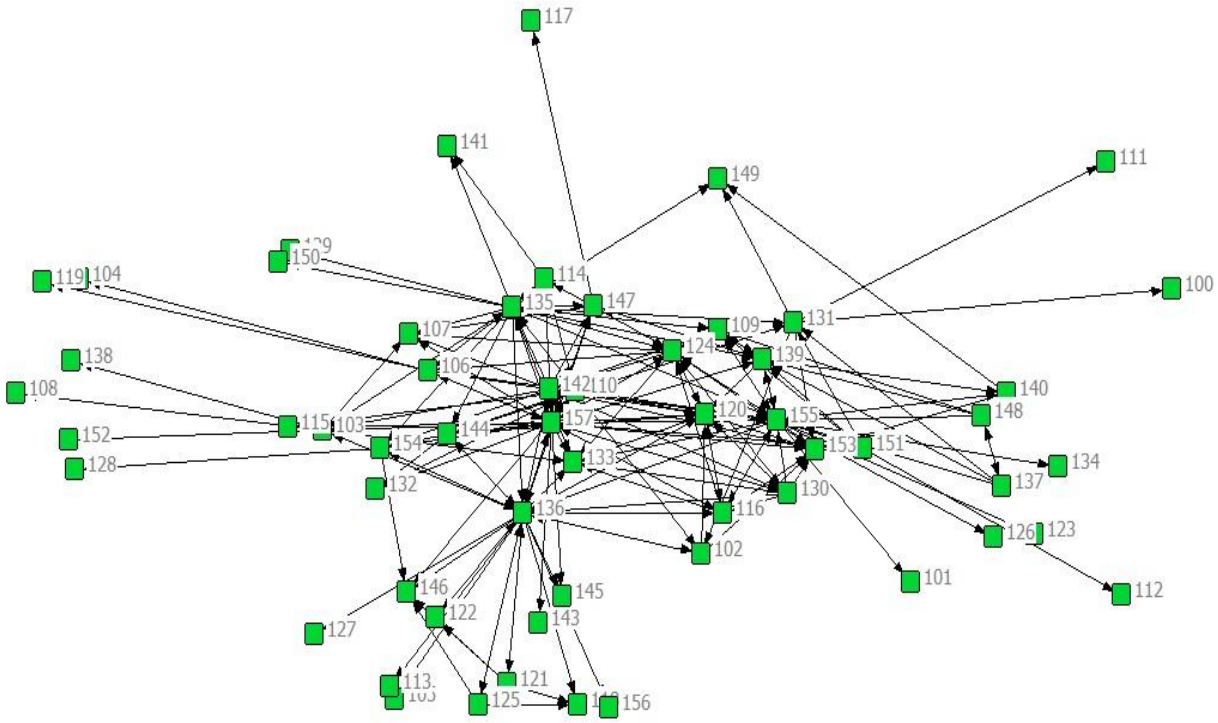


Figure J5: Social network for Parks

CHN Network

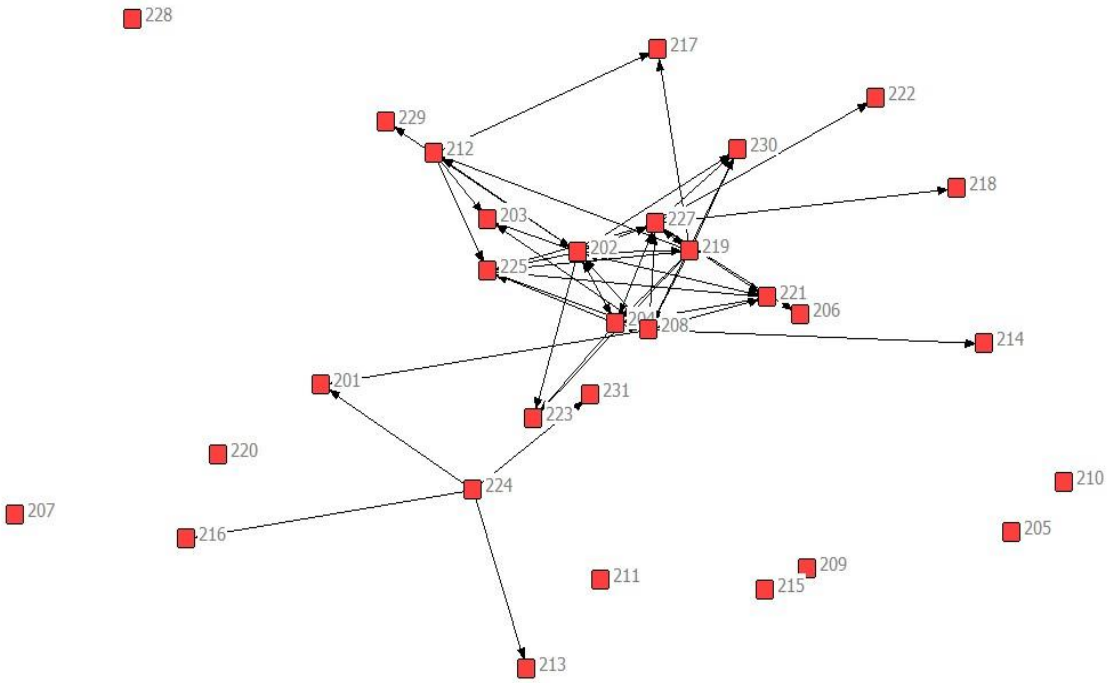


Figure J6: Social network for CHN

DFO Network

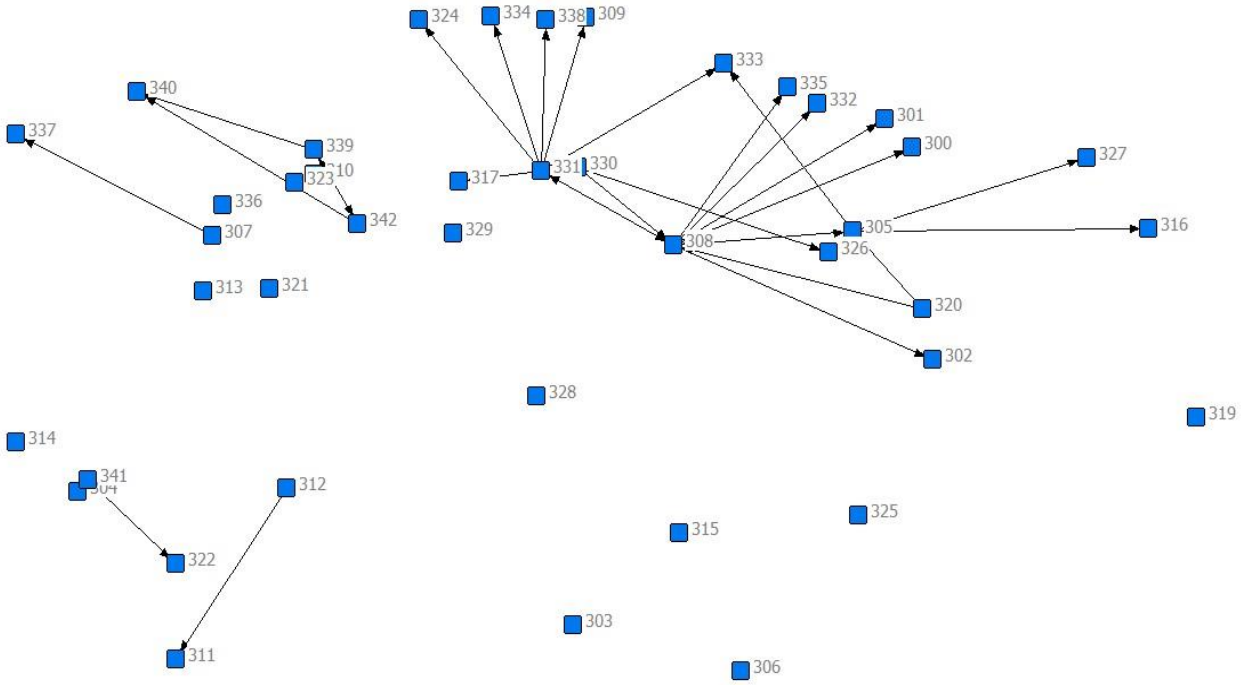


Figure J7: Social network for DFO

APPENDIX K: Heat Diagram Results (tabled)

Participant Organization	Organization assessed	Collective Action	Communion	Tolerance	Communi-cation	Equity
CHN	CHN - DFO	2	1	2	1	1
CHN	CHN - DFO	2	1	1	1	1
CHN	CHN - DFO	2	1	1	1	1
CHN	CHN - Parks	3	3	2	2	2
CHN	CHN - Parks	3	3	3	3	2
CHN	CHN - Parks	3	3	3	3	3
DFO	DFO - CHN	2	3	2	2	2
DFO	DFO - Parks	2	2	2	3	2
Parks	Parks - CHN	2	3	2	2	1
Parks	Parks - CHN	3	3	3	3	3
Parks	Parks - CHN	3	2	3	2	2
Parks	Parks - DFO	1	1	2	1	1
Parks	Parks - DFO	1	1	2	1	3
Parks	Parks - DFO	1	1	2	1	1

Table K1: Heat Diagram Data

APPENDIX L: Charted Heat Diagram Results

CHN results:

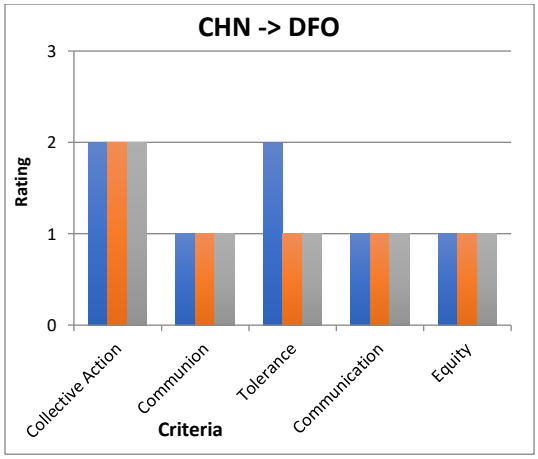


Figure L1: CHN's assessment of DFO

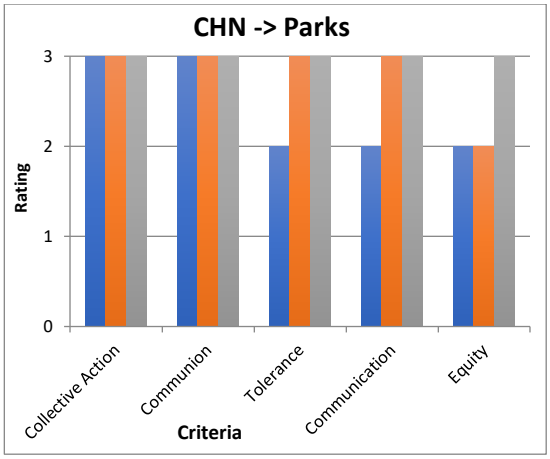


Figure L2: CHN's assessment of Parks

DFO results:

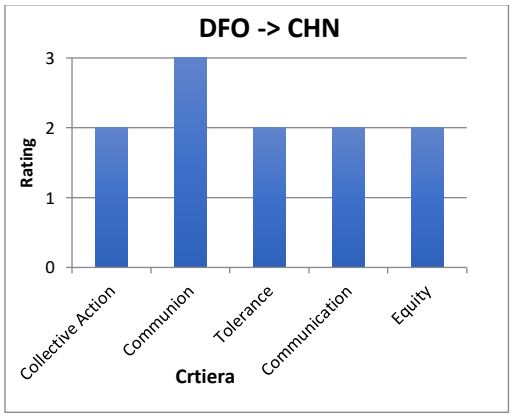


Figure L3: DFO's assessment of CHN

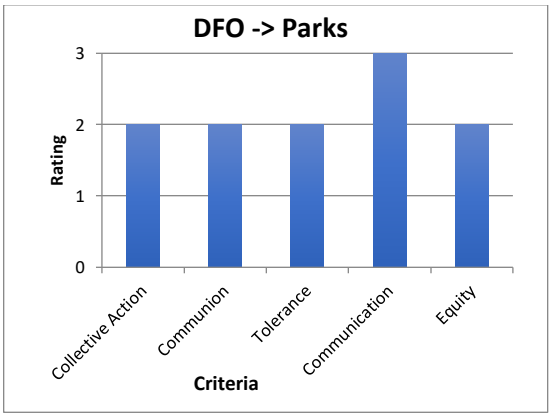
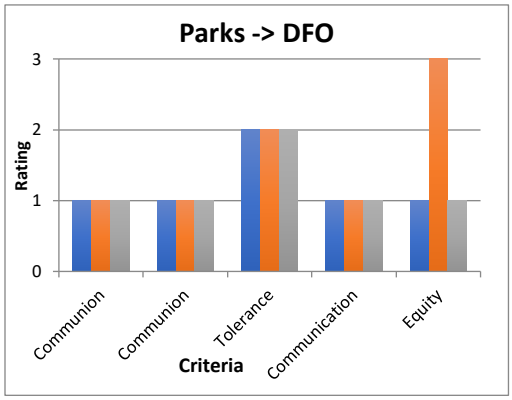


Figure L4: DFO's assessment of Parks

Parks results:



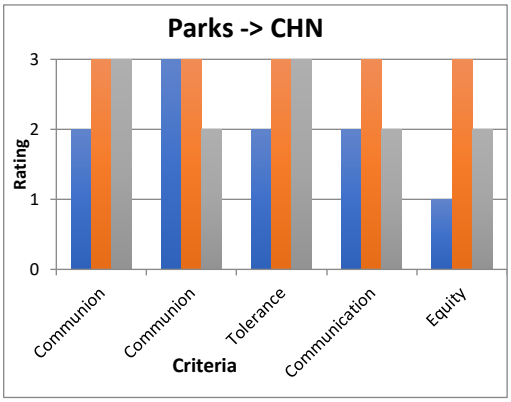


Figure L5: Parks assessment of DFO

Figure L6: Parks assessment of CHN